JESSOP & Co. LTD.

ENGINEERS

(Incorporated in the United Kingdom.)

ESTABLISHED 1799

GENERAL CATALOGUE

(133)

Head Office, General Stores
and Showrooms — 93, CLIVE ST., CALCUTTA

Telegrams : "RELAPSE," Calcutta
Telephone No. 4900, Calcutta
P. O. Box No 108, Calcutta

Works :

Phœnix Iron Works, Structural, Mechanical, Boiler, Bridge and Roof Works — HOWRAH
Wagon Works — GARDEN REACH
Structural Steel Works — JAMSHEDPUR

Offices :

RANGOON	6, Barr Street, Fytche Square	Telegrams : GRESSOP
DELHI	Kashmir Gate	" PHŒNIX
MADRAS	2/140, Pophams Broadway	" PHŒNIX
LUCKNOW	Naseem Mansions, Clyde Row	" PHŒNIX
BOMBAY	Hamilton House, Ballard Estate	" RELAPSE

PREFACE

WE publish this new and enlarged edition of our General Catalogue with the hope that it will prove of service to our constituents in all parts of India, Burma and the East. Our ambition has been to make it useful as a book of reference to all interested in Engineering and Allied Industries.

Owing to the increased pressure of work during the war and in recent years we have enlarged our works at Howrah and Garden Reach and opened new structural works at Jamshedpur.

All our Works are equipped with the most up-to-date machinery and plant. We are, therefore, in a position to give our attention to all classes and any quantity of Engineering work offering.

We are Agents for a number of leading British and American manufacturers whose specialities are illustrated and described in these pages and a large and varied stock is always open to inspection in our show rooms.

The illustrations and technical details have been revised and brought up-to-date as far as possible, but owing to the rapid strides of present day Engineering Science and Practice, we reserve the right to further revise these at any time without notice. Statements and tables of capacities and capabilities of machines and appliances not actually manufactured by us are given without guarantee but they may be taken generally, as approximately correct.

We endeavour to keep abreast of developments and are constantly adding to our stocks, new Machinery, Tools and Appliances.

It is also our constant endeavour to improve the service which we place at our constituent's commands and by a close and careful attention to every order entrusted to us, to merit a confidence which will add others to the very large number of old and valued customers.

CALCUTTA, 1924.

JESSOP & CO., LTD.

TERMS, Etc.

THIS Catalogue has been priced on a nett cash basis but fluctuations of the market, purchases on a large scale and other factors sometimes enable us to allow a discount. In other cases we may be compelled to increase prices without notice.

Delivery, in good condition is guaranteed at all Railway or Steamer Despatching stations but no responsibility is accepted for sound delivery at destination. Any claim for loss or damage should be made to the carrying Company before delivery is taken at Receiving stations. Packing is charged extra at actual cost.

All goods are consigned at "Owner's" Risk Rates unless we are specially ordered by constituents to book at "Railway" Risk Rates. We strongly advise buyers to instruct us to "Insure" all machinery especially if of a fragile kind.

Only the very best materials are used in all Structural and Mechanical supplies manufactured by us. In the event of breakage due to faulty material, if such should occur within six months from date of supply we will replace all defective parts returned to us, carriage paid, for our inspection. We do not however accept any consequential liability.

Please do not Mutilate this Catalogue.

Loose Sheets and Section Lists are Furnished on Request.

JESSOP & CO., LTD.

The
EDINBURGH PRESS
CALCUTTA

INDEX.

PAGE.

A.

Abyssinian Tube Wells 774-76
Acid, Muriatic 174b
Adjustable Dies 6
Adzes 76
Aerial Ropeways .. 114-115
Agricultural Implements .. 672
Air Compressors for "Sullivan" Plant 389-401
„ Compressors for Steam Jet 168a
„ Filters, "Heenan" 534-535
„ Lift Pumping System, "Sullivan's .. 716-719
„ Receivers 402
„ Valves 149
Alligator Belt Fasteners .. 174
Aluminium 277
Ammonia Compressors .. 670
Angle Compressors 400
Angles, Iron or Mild Steel 261-263
Anti-corrosive Solution, Siderosthen 212c
Anti-friction Metal 81
Antimony 277
Anvils 63
Archimedian Ventilators .. 213
Asbestos Boiler Composition 175
„ Cement Corrugated Sheets 285
„ Cement Ridging Tiles 285
„ Fibre Sheets .. 177
„ High Pressure Jointing 177
„ and India-Rubber Sheeting 177
„ Millboard 177
„ Packing 175
„ Paper 175
„ Tape 175
„ Yarn 175
Atlas Grease 218
Attachments for Wire Ropes 109
Augers, Carpenter's 75
Axes, American Felling .. 76
„ Pick 64
Axles, Cast-Steel 99
„ Tubular Steel 100

B.

Back Nuts, W.-I. Pipe .. 157
Balances, Spring 52
Baling Presses 783
Ball Bearings, "Hoffmann's" 224-229
„ „ Hangers 228-229
„ „ Pedestals 228-229
„ „ Washers .. 227

PAGE.

Ball Valves . 147
Ballast Rakes 65
Balls, Steel, "Hoffmann's" 229
Bamboos 174b
Band Saws 72
„ Sawing Machines 620-621
Barbed Wire 185
„ „ Fencing .. 198
Barrows, Coal or Coke .. 92
„ Wheel 92
Bars, Crow 64
Bases for Stanchions .. 291
Base Plates 230
Baskets, Cane 174b
Beams or Joints .. 254-259
„ Dimensions and Properties 256
„ as Stanchions 290
„ connections for .. 292
Bearings, Ball, "Hoffmann's" .. . 224-227
Bearings, Lineshaft, "Hoffmann's" 228
„ Roller, "Hoffmann's" 224-227
„ „ "Timken" 247-252
„ Swivel 223
Bears, Punching 66
Beaters, Railway 64
Beating Gear, Indigo .. 666
Bellows, Moulders' Hand .. 59
„ Smiths 59
Bells, Colliery Signal .. 113
Belt Fasteners, "Alligator" 174
„ "Jackson's" 173
„ "Lagrelle's" 174
Laces 174
Pulleys 231
Punches 174
Belting, Cotton 172
„ Hair 172
Horse Power, Transmitted by 170
„ Leather 172
„ Notes on 171
Benches, Garden .. 209-210
„ Portable Work, "Pioneer" .. 24
„ Vice 24
Bends, W.-I. Pipe 157
Bib Cocks, Brass 146
„ „ Lord "Kelvin's" 146
Bit Sharpeners, Coal Cutter, "Sullivan's" .. 405
Bits, Brace 75
Blacking, Moulders' 58
Blades, Hack Saw 73
„ Rail Saw 73
Blast Furnaces 339, 346-347

PAGE.

Blocks, Plummer 221
„ Pulley 28
„ „ Quick Lifting 29
„ „ "Weston's" 29
Blow Off Cocks 120
Blowers, Roots, Forge and Foundry 541
Blowing Fans 540
Bogies, Heavy Package .. 91
„ Sliding Wheel .. 91
Boiler Composition, Asbestos 175
"Cornish" 479
Disinfecting 96
Indigo 666
"Lancashire" .. 478
Loco Multitublar .. 472
Vertical, "Cochran" 474-477
„ „ Cross-tube 480-482
Bolts and Nuts 281
„ „ „ Galvanized Hook .. 284
„ „ „ Galvanized Slot-head 284
„ „ „ Snap-head Sleeper 279
„ „ „ Weights of 282
Boring Bars 19
„ Machines 593-594
„ Tools 71
„ Tubes 159
„ and Turning Machines 595
Boshes, Water 60
Box Spanners 67
„ Wrenches 120
Boxes, Surface 163
„ Wall 230
Brace Bits 75
Braces, Ratchet 16
Brackets, Cast-Iron 201
Shafting 230
Brake Jig Pulleys 39
Branch Pipes .. 162
Brass .. 277
„ Tubes .. 154
„ Wire .. 185
„ „ Cloth 184
„ Rod Extruded 277
Brazing Lamps 79
Breakers, "Phœnix" Stone 428-430
"Sullivan's" .. .. Concrete .. 410
Breast Drills 16
Bricks, Country 174b
„ Fire 58
„ Presses 442

*Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

PAGE.

Bridges, Erection Tackle for 300
„ and Jetty Steel Work 292f
„ Pontoon 312-313
„ Railway 294-297
„ „ Footover 298-299
„ Road 301-309
„ Signal 319
„ Suspension .. 310-311
Brooms, Country 174b
Brushes, Foundry 79
„ Quill 174b
„ Tube 79
Buckets, Pump Leather .. 178
"Buckton" Testing Machine 292g
Buildings, Factory 322-323, 329
„ Steel Frame 324-326
Bullock Gear 236a
Bunkers, Coal and Handling Plant 352-353

C.

Cable Towers 350
Cages, Pit 42
Cake, Oil, Paring Machines 662
Calcium Carbide 174a
Callipers 76
"Calypsol" Solid Lubricant .. 218
Cans, Oil or Feeder .. 139
Canvas Hose 164
Capples, Wire Rope .. 110
Capping, Ridge, Galvanized .. 284
Caps for Stanchions 291
Carbide of Calcium 174a
Carbon Tool Steel .. 87-88
Carborundum Powder .. 57
Carpenters' Augers 75
Carriers, Lathe 22
Carts, Junker 94
„ Night Soil 94
„ Watering 94
Cart-Weighbridges 46
Case-Hardening Compound 174a
Cast-Iron Pipes .. 150-153
„ „ Pulleys .. 232-234
Castings, Heavy 236b
Cement, Portland 286
„ Fire, "Pyruma" .. 58
„ "Scott's" 179
„ Testing Machine .. 53
Centre Drills 22
Chaff Cutters 698
Chains 38
Chalk, White 174b
Channels, Iron and Steel, Dimensions and Properties 260
Chaplets, Foundry 78
Chequered Plates 271
Chests, Cash Travelling .. 217
Chimneys, Steel 351
Chisels, Chipping 63
„ Firmer 75
Chucks, 2-Jaw Drill .. 17
„ 3-Jaw Lathe .. 17
„ 4-Jaw „ .. 564
Clay, Fire 58

PAGE.

Clips, Copper 211
„ Rope Haulage 110
„ Light Railways .. 279
Cloth, Emery 57
„ Glass 57
„ Gunny 174b
Clutches, Friction .. 233-235
"Clyburn" Spanners .. 67
Coach Screws 215
„ Wrenches 67
Coal Barrows 92
„ Grinders, Disintegrators, "Carr's" .. 431
„ Handling Plant, Bunkers .. 352-353
„ Loading Skips 40
„ Tubs 101
„ Cutters, "Sullivan's" 403-405
„ „ „ Bit Sharpeners 405
Cocks, Blow Off 120
„ Ball or Valve 147
„ Bib 146
„ „ Lord "Kelvin's" 146
„ Cylinder Drain .. 123
„ Gauge 123
„ Gland 119
„ Main 147
„ Oil 146
„ Pet 123
„ Plug 119
„ Pressure Gauge .. 129
„ Range, Brass . 146
„ Spring Push 147
„ Test 123
„ "Waste-not" 147
„ Water Gauge Glass 126
Coir Yarn 174b
Coke Barrows 92
Collars, Loose 231
Colliery Bells, Signal 113
Compasses, Wing 76
Composition, Asbestos Boiler 175
„ Ship's .. 183
Compound Case-Hardening, Kasenit .. 174a
„ Iron and Steel 179
Compressors, Air, "Sullivan" . .. 398-401
Concrete Breakers, "Sullivan" 410
„ Mixers . .. 440
Conductors, Lightning .. 211
Cone, Mills, Rice 640
Connections for Beams .. 292
Conveyors, Electric 360
Coolers, Air, "Heenan" 534-535
„ Water „ 532-536
Cooly Houses .. 330a-d
Cooper, Clips 211
„ Ingot 277
„ Nails 211
„ Rivets 281
„ Tape 211
„ Tubes 154
„ Wire Cloth 184
Copra Cutters 656
„ Mills 653

PAGE

Corn Crushers 696
Corrugated Fencing, Pale .. 187
„ Sheets, Asbestos 285
„ „ Galvd. 283
„ Skylights „ .. 284
Cotters, Split or Pin 216
Cotton Belting 172
„ Waste 174b
Counters, Engine 135
„ Pocket 135
„ Shafting 135
Countersinks, Combined Drills 22
Country Stores 174b
Couplings, Flanged .. 220
„ Hose 166
„ Muff 220
Crab Winches 31
Cranes, Electric 361
„ Hand .. 34-36
„ Hydraulic 358
„ Locomotive 372-373
„ „ Water 143
„ Overhead 32-33
„ „ Electric 357-361
„ Semi-Portable .. 356
„ Steam, Fixed .. 371
Crestings 201
Crippling, Loads for Struts .. 288
Crosses, W.-I. Pipe 157
Crossings, Railway 280
Crow Bars 64
„ Foot Spanners 67
Crows, Jim 66
Crucibles, Salamander .. 58
Crushing Mills, Sugar Cane 703
Cultivators 686
Cups, Tallow 138
Cupolas 543
Curbs, Well 292h
Cutters, Chaff 698
„ Coal, "Sullivan" 403-405
„ „ Bit Sharpeners 405
„ Gauge Glass 127
„ Milling 8-12
„ Tube, 3-Wheel .. 69

D.

Dephlegmators 236c
Diamonds, Glaziers 79
„ Tool Emery Dressing .. 57
Dies, B.A. Threads 6
„ B.S.F. „ 6
„ Gas „ 5
„ "Whitworth" Threads .. 5
Disinfecting Boilers 96
Disintegrators, Coal, "Christy and Norris'" .. 432-437
Distintegrators, Coal, "Car" Type 431
Distemper Paint, Paste .. 181
Distilling Plant 169
Dividers, Spring 76
Dog Spikes 279
Dogs, Lathe 22

Electrical Plant Apparatus and A ances,—See Separate Electrical Department Index.

PAGE.

"Donaldson's" Patent Ejectors 96b
Doors, Strong Room .. 217
Drain Cocks, Cylinder .. 123
Drainers, Settling Tank .. 149
Dressing Machines, Grain .. 695
Drifts, Drill 16
Drill, Mountings for, "Sullivan" .. 414
„ Stands, Water Main .. 168b
„ Sleeves 21
„ Steel "Sullivan" .. 412
„ „ Furnace 416
„ „ Sharpeners .. 415
Drilling Apparatus 168b
„ Machines .. 569-581
„ Pillars 17
Drills, Breast 16
„ Causes of Fracture to 14
„ Ratchet Brace . 15
„ Rock, "Sullivan" .. 413
„ Speed & Feed Table 14
„ Straight Shank .. 15
„ "Sullivan" Rock and Hammer .. 406-408
„ "Sullivan" Water Hammer 409
„ Twist 14, 15
„ Valveless Stoping, "Sullivan" .. 410
Drivers, Pile 439
Dynamos and Motors (See Electrical Index).
Dung, Cow, for Foundry .. 174b

Edges, Straight 77
Ejectors, Steam Jet .. 168a
„ Indigo Mall .. 667
Elbows, W.-I. Pipe 157
Electrical Plant, etc.: (See Electrical Index).
Electrician's Pliers .. 77
Eliminators, Paddy 645
Emery Cloth 57
„ Powder 57
„ Wheels .. 54-56
Engine Counters 135
Engines, Gas Coupled 510-511
„ „ Description 505-508
Description • .. 522-523
„ „ Notes on Selecting .. 506
„ „ Single Cylinder 509-510
„ Oil, "AA" Type 518
„ „ „ „ Description 522-523
Engines, Oil, Heavy, Notes on 496
Spare Parts 528
Engines, Oil, "AA" Type, Electric Lighting .. 524
Engines, Oil, "AA" Type, Notes to Buyers .. 525
Engines, Oil, "AA" Type, Users of 527

PAGE.

Engines, Oil, Heavy, "Tangye's" 483-496
Engines, Oil, Heavy, Coupled 494
„ „ „ Description 486-490
Engines, Oil, Heavy, Notes on 496
„ „ „ on Tea Estates 498
Engines, Oil, Heavy, Quick Change All-Fuel .. 500-501
Engines, Oil, Heavy, Spare Parts Service 490
Engines, Oil, Heavy, Tests 491
Engines, Oil, Air Receiver Charging or Starting 502-503
Engines, Oil, 4-Stroke vs. 2-Stroke 504
Engines, Oil, Portable, "Tangye's" 526
Engines, Oil, Portable, "Wizard" 531
Engines, Oil, Stationary .. 530
„ „ "Wizard" Description 529
Engines, Steam Compound 454-457
„ „ Girder Frame 456-457
„ „ Locomotive 374-379
„ „ Long Stroke Stationary 452-453
Engines, Steam Portable 463-466
„ „ „ Compound 467-469
Engines, Steam, Semi-portable 470-471
„ „ Short Stroke Stationary 458-459
„ „ Traction Agricultural 462
Engines, Steam, Vertical 460-461
„ „ Winding 364-367
Erection Tackle, Bridges .. 300
Excavators, "Marion" 444-448
Exhaust Heads 134
Expanded Metal . .. 287
. Lathing .. 287
Expanders, Tube 13
Extinguishers, Fire, Simplex 168b
Extruded Metal Brass .. 277

F.

Factories, Buildings 322-323, 329
Fans, Blowing 540
„ Electric: (See Electrical Index).
Fasteners, Belt "Alligator" 174
„ „ "Jackson's" 173
„ „ "Lagrelle's" 174
Felling Axes, American .. 76
Feeders or Oil Cans .. 139
Fencing, Barbed Wire .. 193
„ Corrugated Pale 187
„ „ Sheet 187
„ Garden and Maidan 193
„ "Hercules" Woven 192
„ Iron Bar, Spiked 186
„ Plain Wire 191
„ Standard Pale 188

PAGE.

Field Gates 194
Fibre, Sheet, Asbestos .. 177
Files 1-3
Filters, Air, "Heenan" 534-535
„ Oil 136
Filter Plant, Water 793-794
„ Press Oil 664
Findlay's Metal 81
Fire Appliances 163
„ Bricks 58
„ Cement 58
„ Clay 58
„ Extinguishers .. 158b
„ Hydrants 163
„ Wood 174b
Flanges, British Standard 154
„ Prices. See Pipe Fittings .. 156-157
Flat Iron 270
„ Mild Steel 262
„ „ „ Weights of 268
Flatteners, Jewellers .. 701
Floor Stands, Shafting .. 230
Flour Mills 646
Foot Rules 78
„ Valves 148
Forge and Foundry Blowers 541
Forges 59
Foundry Appliances .. 78
„ Brushes 79
„ Chaplets 78
„ and Forge Blowers 541
„ Ladles 58
Fountains, Pillar 168
„ Wall 168
Friction Clutches 233, 235
Furnace, Drill, Steel, "Sullivan" 416
Furnaces, Blast 339, 346-347
„ Morgan's Tilting 542
Fusible Plugs 133

G.

Garden Benches .. 209-210
„ Fencing 193
„ Reach Works, Our 292e
Gas Engines 505-511
„ Oxygen 174b
„ Producers, Suction 512-517
Gates, Collapsible 196
„ Field 194
„ Leaf 189
„ Ornamental C.-I. 197-199
„ Railway Crossing .. 195
„ Sliding 196
„ Sluice 149
„ Wicket 189
Gauge Cocks 123
„ Glasses 127
„ „ Cutters .. 127
„ „ Rings .. 127
Gauges, Pressure, Bourdon's 128
„ „ Hydraulic 128
„ „ Schaffer's 129
„ Surface 77
„ Vacuum 129
„ „ and Pressure 129
„ Wire, Birmingham 78

Electrical Plant Apparatus and Appliances.—See Sep[illegible] Electrical Department Index.

PAGE

Gears, Bullock . . 236a
„ Reduction . 363
„ Cutting Machines 592
Gear Wheels . . 236
Gearing, Mill 236
„ for Sluice Valves 145
Generating Sets, Electrical.
(See Electrical Index)
Glacier Metal, Antifriction 81
Gland Cocks . 119
Glass Cloth 57
„ Paper .. 57
Glazier's Diamonds . 79
Glue . .. 174b
Godowns 328
„ Rice . 330
Gouges, Firmer 75
Governors, Steam Engine,
Pickering . .. 134
Grease, "Atlas" 218
„ "Calypsol" 218
„ "Stauffer's" 218
Grovers Washers, Spring . 216
Grindstones 57
Grinding Wheels 54 56
„ „ Corundum 56
„ „ Grain and
Grade . 55
„ „ Speeds of 55
„ Machines 610-617
„ Mills 438 439
„ „ Flour 616
„ „ Paint 702
Guides, Pulley, Jute Mill 231
„ Wire Rope 41
Gutters, Galvanized 284

H.

Hack Saws 73
„ „ Blades 73
Hair Belting 170, 172
Hammer and Rock Drills,
"Sullivan's" 406 408
„ Water Drills,
"Sullivan's" 409
„ Drills, Steel, for
"Sullivan's" 412
Hammers, Boiler makers' 62
„ Canterbury 76
„ Engineers' 62
„ Keying 63
„ Miner's 63
„ Pick, "Sullivan's" 411
„ Pneumatic 539
„ Quarry 63
„ Sledge . 62
„ Spiking . 63
„ Steam 538
„ Stone Breakers' 63
"Hancock's" Inspirators 131
Hand Bellows, Moulders' 59
„ and Overhead Cranes 32-36
„ Saws 73
„ Vices 75
Handles, Hammer .. 62
„ Chisel . .. 75
„ Pick . 64

PAGE

Hangers, C. I. Shafting 222-223
Harrows, 8 Discs 688-689
„ 16 „ .. . 690
„ Spike .. . 691
Haulage Clips, Rope .. 110
„ Gear . . 362
„ Pulleys . . 111
„ Rollers . 111
Hauling Engine . . 368
Heads, Exhaust .. 134
Hearth, Smith's 60
Heaters, Oil Seed . 655
"Heenan" Cooler 532 536
„ Air Filters 534-535
"Hercules" Fencing .. 192
Hides, Hydraulic Pump . 178
"Hoffmann" Bearings 224-229
Hoists or Lifts, Hand 37
„ "Sullivan" 417 418
Hooks, Bolts, Galvanized 281
„ Safety Mining 112
Hoops, Mild Steel .. 270
Hose, Aeroflex, Pneumatic 166
„ Air and Steam and
connections 412
„ Canvas . 164
„ Coupling 166
„ Flexible Metallic 167
„ I. R. Delivery 165
„ I. R. Suction 165
Houses, Cooly 330a-d
Howrah Works, Our 292a
Hullers, Rice, "Simon's" 638-639
„ „ "Hindustan" 642 643
Hydrants, Fire 163
„ Stand Pipes 162
Hydraulic Baling Press 781-786
„ Cranes 358-359
„ Jacks 27
„ Leathers 178
„ Packing 176
„ Press, Oil 657
„ „ „ Erasmus
Battery System
781-659
„ Pressing Plant 781 792
„ Pressure Gauges 128
„ Pumps 787
„ „ Hide 178
„ „ Oil 660 661
„ Rail Benders 66
„ Tubes 158

I.

Ice Making Machinery 668-671
India Rubber and Asbestos
Sheet 177
India Rubber Insertion . 178
„ „ Sheet 178
Indicators, Depth . 361
„ Speed . 135
„ Steam Engine,
"Casartelli" 132
„ Steam Engine,
"Crossby" 132
„ Steam Engine,
"Richard's" 133

PAGE.

Indigo Appliances .. 666
Injectors, "Gresham's" .. 130
„ "Metropolis" 131
„ "Penberthy" 130
Insertion Sheeting . .. 178
Inspirator, "Hancock's" 131
Iron, Flat, Grade "A" 270

J.

Jack Planes . .. 74
Jacks, "Haley's" .. 26
„ Hydraulic Lifting &
Traversing . 27
„ Hydraulic Oil Well 27
„ „ Ship's .. 27
„ Motor Car 26
„ Screw Lifting .. 26
„ „ Traversing 26
„ Transport . .. 26
Jamshedpur Works, Our .. 338
Jetties 314 315
„ Steel Work for . 292c
Jetty Wagons 102
„ Warehouses 316 318
Jewellers' Rollers 701
„ Polishers 700
Jim Crows 66
Joint Rings . .. 179
„ Sheeting, High Pressure 177
Joists or Beams . 254-259
Jumpers . . 64
Junker Carts . 94
Jute Mill Buildings . . 331
„ Softening Machines 632
„ Waste . . 174b
„ Weighing Machines 48

K.

"Kasenit" Case Hardening
Compound . . 174a
Keps, Colliery . . 41
Keyseating Machine .. 590
Keyway Cutting Machine 591
Kettles, Oil Seed 655
Kibbles . .. 39
Knives, Planing and Thicknessing 74
Knurling Tools 22
Kodalies . . 65
"Krysilde" Grinding Wheels 56

L.

Laces, Leather . .. 174
Ladles, Foundry 58
Lagging Steel, Russian 271
Lamps, Brazing 79
„ Miners' Safety .. 113
Lamp Posts 210
Lathe 544
„ Britannia Treadle . 544
„ Capstan .. 506, 561
„ Carriers 22
„ Copying 624
„ Chucks 564
„ Gap Bed . 548, 549
„ Dogs 22
„ Double Geared .. 546

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

PAGE
Lathe Heavy Duty . 548-552
" Railway Wheel, Double . . 558
" Relieving 550
" Self-Acting Sliding, Surfacing and Screw Cutting . 545
" " Double Geared . 546
" " High Speed . 553
" Surfacing 554
" " and Boring 556
" " " " Double Geared 557
" Treble Geared Break 555
" Turret, All-Geared 547, 563
" " for Bar Work 562
" "Wilson," 8½ by 8 548
" " High Speed 8½ by 8 . 549
" Wood Turning 624
" Tools 18 20
Lathing Expanded Metal 287
Latrines . . 98
Launches, Motor 381
Lead, Ingot 277
" Sheet . 277
" Wire 178
" Wool . 178
Leather, Hydraulic 178
" Belting . 172
Leathers, Hydraulic Ram 178
" Pump Bucket 178
Leg Vice .. 25
Levels, Spirit 78
Levers, Shunting Automatic 242
Lifts, Hand 97
" Electric (See separate Electrical Index)
Lifting Tackle . 28 37
Lightning Conductors 211
Lime 174b
" Stone 174b
" Chloride 174b
Limpet Washers 281
Line Shaft Bearings "Hoffmann's" 228 229
Locomotive Cranes . 372-373
" " Water 143
Locomotives, Standard Gauge 374 375
" Narrow Gauge 376-377
" Fireless .. . 379
Logline 174b
Looms 633
Loose Collars .. . 231
Lubricant, Atlas . 218
" Calypsol .. 218
" Stauffer's .. 218
" Tangye's Oil Engine 218
Lubricators Bayonet Top 138
" Double Grease or Tallow 138
" Drop Feed 137
" Glass Needle 138
" Sight Feed 137
" Stauffer's 139
" Suet .. 138
Luggage Weighing Machine 47

PAGE
M.
Machine Tools 537 617
" Screws, Whitworth 215
Machines, Band Sawing . 621
" Boring Horizontal 593
" " Vertical .. 594
" " and Turning 595
" Buckton Testing 292g
" Cement Testing .. 53
" Cold Sawing 609
" Concrete Mixing 440
" Copra Cutting .. 656
" Drilling Bench 566
" " Empire . 571
" " New Century, 20 ins 570
" " 11 ins Sensitive 569
" Drilling, New Century, 27 and 30 ins .. 572
" " Precision 567
" " Radial, Light .. 574
" " Radial, Sensitive 575
" " Radial, High Speed 576
" " Radial, 4 to 6 ft 578
" " Radial Central Thrust 5 to 7 ft 580
" " Radial, Swing Jib 581
" " Sensitive Bench 567
" " Sensitive, 14 ins 568
" " Sensitive 14 ins Multiple Spindle 569
" " 20 ins Vertical 570 571
" " "Yankee" 566
" Gear Cutting, Plain 592
" Grinding . 610 617
" " Double Dry 615
" " Drill, Twist 616 617
" " Equipment for 613
" " Internal 612
" " Paint 702
" " "Rego" 614
" " Universal 611
" Hack Sawing New Fortuna 606
" " New High Speed No 10 607
" " " Power 608
" Horsfall's Bolt and Nut . 599
" Hot Sawing 609

PAGE
Machines Jewellers' . 700
" Jute Working . 632
" Key Seating .. 590
" Keyway Cutting . 591
" Mortising Wood .. 625
" Moulding, " .. 628
" Milling, Universal 596-597
" Nut Forging .. 598
" " Tapping .. 600
" Oil Cake Paring 662 663
" Oil Seed Cleaning 648
" Planing, Self-Acting .. 586
" " Two Belt . 587
" " Wood .. 626
" Punching and Shearing, Single-ended 604
" " Double-ended 605
" Quarrying, "Marion" 444
" " "Sullivan" 406
" Rail Sawing "Linn tax" 606
" Road Sweeping 95
" Sawing Cold 609
" " Hack .. 606
" " Hot 609
" " Rail 606
" " Log Frame 618
" " Horizontal 619
" " Log Band 620
" Screwing, Bench 601
" " Pipe and Bolt 602
" " Q R . 603
" Shaping, Traversing Head 585
" " Heavy Duty 582-584
" Shearing 604
" Shellac Washing 665
" Slotting . 588
" " Heavy 589
" Tenoning Wood 629
" Textile 632 633
" Tool Grinding, "Rego" 614
" " Grinding "Universal" 616
" Universal Woodworking 627
" Weighing 43-53
" Woodworking 618-631
" Wood Sawing 622-623
Mall Epcons, Indigo .. 667
Main Cocks, C-I .. 147
Mandrels 21
Manholes .. 163
Marion Shovels . 444
Measuring Tapes . 78
Metallic Packing . . 176
" Hose .. . 167

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

PAGE.

Metals, Steel and Iron Sections .. 253
„ Expanded Lathing 287
„ Non-Ferrous .. 277
„ Anti-friction .. 81
„ Findlay's Motor .. 81
Meters, Water . .. 142
Mile Posts 95
Millboard, Asbestos .. 177
Milling Cutters 8-12
„ Machines .. 596-597
Mills, Building for .. 340-341
„ Copra Breaking .. 653
„ Flour 646
„ Grinding 438
„ Jewellers' 701
„ Jute Buildings for .. 331
„ Oil 647
„ Paint Grinding .. 702
„ Plate Buildings 342-343
„ Pug 441
„ Rice 634
„ Roller Oil Seed .. 654
„ Seed Flatening .. 652
„ Soorkie 439
„ Sugar Cane Crushing 703
Miners' Lamps .. . 113
Mixers, Concrete 440
Motor Tyres 243-246
Mountings for "Sullivan" Drills .. 414
„ „ "Sullivan" Rotators 408
Moulders' Bellows 59
„ Blacking .. . 58
„ Tools 58
Mud, Mugra 174b
Muff Couplings for Shafting 220
Multitubular Loco Boiler .. 472

N.

Nail Pullers 77
Nails, Copper 211
„ French Wire 216
Nickel 277
Nipples, W.-I. Pipes .. 157
Non-Ferrous Metals .. 277
Notes on Abyssinian Tube Wells 775
Notes on Beams .. 254-255
„ „ Belting 171
„ „ Boring Plant .. 70
„ „ Gas Engines .. 506
„ „ „ Producers .. 517
„ „ Grinding Wheels 54
„ „ Locomotive Practice 378
„ „ Oil Engines .. 496
„ „ Spring Steel .. 89
„ „ Stanchions .. 288
„ „ Struts 288
„ „ Tool Steel .. 82
„ „ Trough Floor Plates .. 272-276
„ „ Tube Wells .. 70
„ „ Twist Drills .. 14
„ „ Wire Rope .. 107

PAGE.

Nozzles and Branch Pipes .. 162
„ Spray Pump .. 779
Nut Forging Machines .. 598
„ Making „ .. 599
„ Screwing „ 601-603
„ Tapping „ .. 600
Nuts and Bolt . . 281
„ „ W.-I Pipes .. 157

O.

Ochre, Yellow 174b
Octagonal Steel Bars, Weights of 267
Offices, Buildings for .. 348
Oil Cans or Feeders .. 139
„ Cocks 146
„ Cylinder, Lubricating . 218
„ Expellers 650
„ Filters 136
„ Filter Presses . .. 664
„ Kerosene 174b
„ Linseed 174b
„ Lubricating . .. 218
„ Mills 647
„ „ Donaldson's .. 665
„ Presses . . . 657
„ Syphons . .. 138
„ Tanks 96a
Ore Crushers . 428-430
Oxygen Gas 174b

P.

Packing, Asbestos 175
„ Hydraulic 176
„ Metallic . .. 176
Paint, Cold Water .. . 181
„ Dry 180
„ Miscellaneous .. 182
„ Mills or Grinders .. 702
„ Prepared 182
„ Ship's Composition .. 183
„ Signal Enamel .. 183
Pale Fencing, Corrugated 187-189
Paper, Asbestos 175
„ Glass 57
„ Mill Machinery .. 704
Paste, Distemper 181
Pedestals, Ball Bearing .. 228
„ C.-I. Wheels and Axle 99
„ Shafting .. 230
Penstocks 149
Pet Cocks 123
Phowras 65
Picks 64
„ Quarry 64
Pick Axes 64
„ Hammers, Pneumatic 411
„ Handle 64
Pile Drivers 439
„ Screws 292f
Pillars, Drilling 17
Pins, Split 216
Pipe Castings 236d
„ Fittings 155

PAGE.

Pipes, Cast-Iron 150
„ Galvanized 155
„ Hydraulic 158
„ Spun Iron 152
„ Stoneware, Glazed .. 212
„ Steam, Wrought-Iron 155
„ Water or Gas, Wrought-Iron .. 155
Pit Cages 42
„ Head Gear 354
Plane Irons 74
Planes, Jack 74
„ Smoothing 74
„ Trying 74
Planing Machines .. 586-587
Plates, Chequered 271
„ Galvanized 283
„ Panel 270
„ Screw 7
„ Sole or Base 230
„ Steel 271
„ Surface 77
Pliers, Electrician's 77
Ploughs 672-685
„ Ceres 680
„ Disc 683
„ E. C. A. 681
„ E. T 677
„ Jat 674
„ Light Balance .. 675
„ Meston 673
„ Monsoon 674
„ Patthartor 676
„ Punjab 675
„ Reis 677
„ Ridging 682
„ Sabul 676
„ S. A. E. .. . 679
„ Tractor 684
„ Turnwrest 678
„ Victory 681
„ W. T. S. 673
Plug Cocks 119
Plugs, Fusible 133
„ Sparking 174a
„ W.-I. Pipes 157
Plumbago, "Morgan's" .. 58
Plumbobs 77
Plummer Blocks 221
Pneumatic Hammers .. 539
Pocket Counters 135
Polishers, Jewellers' 700
„ Rice .. 640-643
Portable Air Compressors, "Sullivan's" .. 394-397
Posts, Lamp 210
„ Mile 95
„ Street, Water .. 168
Pontoon Bridges .. 312-313
Powder, "Carborundum" .. 57
„ Emery 57
Presses, Bailing, Hydraulic 792
„ Brick Making .. 442
„ Hydraulic Oil .. 659
„ Oil Filter 664
„ Plate Layers or Rail 103
„ Tile 443

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

PAGE.

Pressing Plant, Oil 659
„ „ Textile .. 781
Pressure Gauges 128
„ „ Hydraulic 128
„ „ Schaffer's 129
„ „ Vacuum and Pressure 129
Prime Movers .. 451-536
Producers, Suction Gas 512-517
Prop Withdrawers 113
Pug Mills 441
Pulley Blocks 28
„ „ Quick Lifting 29
„ , Weston's . 29
Pulleys, Brake Jig .. , 39
„ Belt 231
„ Cast-Iron 232
„ Gallows 231
„ and Frames . 111
„ Mill 231
„ Pit Head 41
„ Rope, Cast-Iron . 233
„ „ Guide .. 41
„ Wrought-Iron . 232
Pump Buckets, Leather . 178
Pumps and Pumping Machinery 705-780; 787-789
Pumping Data and Calculations 706
„ Plant Particulars 707
„ Sets, Oil 732
„ „ Steam . 757
„ „ Wizard .. 730
„ System, "Sullivan" Air Lift 716-719

Pumps, Belt or Power Driven.
Aquatole Chain .. 766
Byron Jackson Turbine 720
Centrifugal . . 708
„ Turbine .. 711
Deep Well Turbine .. 720
„ Lift & Force 772
„ Double Plunger 765
Duplex Power . . 728
Hydraulic Oil Press 660
„ Portable .. 788
„ Three Throw 787
Tan Gyro, Tangye's 708 713
Treble Ram 724
Turbine 714 & 720-723
Vertical Ram . 726

Pumps, Hand Power.
Abyssinian Tube Well .. 774
Aquatole Chain .. . 766
Boiler Test .. . 780
Challenge Force .. . 762
Cistern Suction .. . 773
Columbia Force 762
Contractors 760
Deep Well Lift & Force 772
„ „ Double Plunger .. 765
Deluge .. . 759
Diaphragm 759
Double Acting House Force 763
„ „ Brass Barrel 769
Fire, Portable 760

PAGE.

Fire and Ships' .. 761
House Force 763 & 773
Hydraulic Press 787-789
Kite Motion .. 769
New Deluge .. 759
„ Diaphragm .. 759
Pitcher Spout .. 773
Selection of .. 758
Semi-Rotary .. 764
Ships' 761
Single Brass Barrel .. 768
Spray, "Fruitall" or Barrel 777
Knapsack .. 779
Portable or Bucket . 779
Rotary Force 763

Pumps, Steam.
Boiler Feeder . 734-739
Cameron .. 734
Duplex Ballast, Tangye's 743
„ Boiler Feeder, Tangye's 736 739
„ Standard, Tangye's 740 742
„ Centre Ram Type, Tangye's 744
„ Mine, Ram Type 746
Donkey, Mumford's Type 733
Pulsating 756
Special, Tangye's . 748
„ Ram Type 752
„ „ „ Advantages of . 753
Sinking, Tangye's 754
„ Cornish . 755
Vacuum, "Sullivan's" 390 & 401

Pumps, Well.
Abyssinian Tube Well .. 774
Air Lift, "Sullivan" .. 716
Aquatole Chain . . 766
Double Brass Barrel . 769
„ Plunger . 765
Lift and Force . . 772
Byron Jackson Turbine 720
Punches, Belt . . 174
Punching Bears . 66
„ Machines 604-605
Punkha Wheels, Stoney's 213
Push Cocks, Spring .. 147

Q.

Quarry Hammers .. 63
„ Picks .. 64
„ Plant Machinery, "Marion" 444-448
„ Plant Machinery, "Sullivan" 406-413
Quick Change Oil Engines 500
„ Lifting Pulley Blocks 29
„ Speed Governor, Pickering .. 134

PAGE.

R.

Rail Benders 66
Railings, Ornamental 202-208
Rail Sawing Machine .. 606
„ „ Blades .. 73
„ Screws 279
„ Switches 280
Railway Beaters 64
„ Bridges .. 294-297
„ Crossing 280
„ Latrines 98
Light Equipment 278-280
Overbridges, Foot 298-299
Platform Roofs .. 319
Rolling Stock 237-241
Running Shed .. 319
Signal Bridge .. 319
Track, Portable .. 279
Trollies 103 & 386
Weighbridges 43-46
Workshop Buildings 320-321
Rakes, Agricultural .. 692
„ Ballast 65
Range Cocks, Brass .. 146
Ratchet Braces 16
Reamers, Expanding .. 13
„ Fluted 13
Receivers, Air, "Sullivan" 402
Recorders, Integrating Discharge .. 141
„ Water Level .. 140
Resin 174b
Rice Godowns 330
„ Hullers, "Simon's" .. 638
„ „ "Hindustan" 642-644
„ Milling Machinery .. 634
Ridging, Galvanized .. 284
„ Asbestos 285
Rings, Gauge Glass, I. R .. 127
„ Joint, "Hulburd's" 179
„ „ "Taylor's" .. 179
Rivets, Copper 281
„ Galvanized 281
„ Mild Steel and Iron 281
Road Boxes 163
„ Bridges 301-309
„ Rollers, Bullock .. 93
„ „ Motor . 420 426
„ „ Steam .. 427
„ Scarifiers 426
„ Sweeping Machines 95
Rock and Hammer Drills, "Sullivan's" 406-408
„ Drills, "Sullivan's" 413
"Rok" Roofing 212a
Roller Bearings, "Hoffmann's" 224-227
„ „ "Timken" 247-252
„ Steel, "Hoffmann's" 229
Rollers and Frames 111
„ Jewellers' 701
Rolling Mills, Buildings .. 340

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

PAGE.
Roller Mills, Oil Seed .. 654
Rope, Attachments for 109-110
„ Bridge . .. 108
„ Cage Guide 108
„ Capples . . 110
„ Coir 174b
„ Flexible Winding and Haulage 106
„ Galvanized Steel Wire . 107-108
„ Hemp, "Manilla" 174b
„ Notes on . 107
„ Sockets 109
„ Steel Wire . 104 108
Ropeways, Aerial .. 114-115
Rotators, "Sullivan" Drill 408
„ „ Mountings for .. 408
Rules, Foot 78

S.

Sack Marking Composition 212d
Safes 217
„ Phipps' Travelling .. 217
Salamander Crucibles .. 58
Salt Trucks .. . 102
Sand, "Mugra" . 174b
Saw Benches . . 622-623
Saws, Band 72
„ Circular .. 72
„ Cross-cut 73
„ Hack 73
„ Hand .. . 73
„ Metal Slitting 10
„ Pit 73
„ Tenon . .. 73
Sawing Machines .. 606-609
„ „ Log 618-620
Scales 51
Scarifiers, Road .. 426
Scott's Cement .. 179
Screens, "Soorkie" .. 439
Screw Plates 7
Screws, Brass, Wood .. 214
„ Coach . .. 215
„ Indigo 667
Screws, Iron Galvd Roof 284
„ „ Wood .. 214
„ Pile . .. 292f
„ Rail 279
„ Set . .. 215
„ "Whitworth's" Machine .. 215
Screwdriver 75
Seed Cleaners . .. 648
Semi-Portable Cranes .. 356
Separators or Eliminators, Paddy and Rice . . 645
Shafting Mild Steel . 219
Shaping Machines .. 582-585
Shellac Washing Machine 665
Sheeting, India Rubber . 178
„ Joint 177
Sheets, Steel, Perforated .. 184
„ Galvd, Plain .. 283
Ships' Composition 183
Shovels, "Marion" . 444-448

PAGE.
Shunting Levers 242
Siderosthen Anti-corrosive Solution 212c
Sieves 174b
Signal Bells, Colliery .. 113
„ Bridges, Railway .. 319
Skips, Coal Loading .. 40
Skylights, Galvd. 84
Sleepers, Light Railway .. 278
Sleeves, Drill . . 21
Slotting Machines .. 588-589
Sluices or Sluice Gates .. 149
Smith's Bellows .. 59
„ Hearths 60
„ Tools . .. 61
Soap Machinery 704
„ Soft 174b
„ Stone 174b
Sockets, Conical Rope .. 109
„ Off take .. 109
„ W-I Pipe .. 157
Soda, Carbonate . 174b
„ Caustic 174b
Soorkie 174b
„ Mills 439
Spaders, "Sullivan's" 411
Spanners, Box . . 67
„ "Clyburn" 67
„ "Crowfoot" . 67
„ Double-ended .. 67
„ Single-ended .. 67
Sparking Plugs . 174a
Split Pins or Cotters .. 216
Speedometers 135
Spikes, Dog .. . 279
Sprayers or Spray Pumps 777-779
Spring Balance . .. 52
„ Steel 89
Springs „ B S S for .. 89
Sprinklers, Automatic 160-161
Spun Yarn 174b
Squares, Engineers' .. 77
Staircases, Spiral .. 200
Stanchions, I Beam 288-290
„ Bases for . 291
Standpipes, Hydrant . 162
Stands, Floor for Shafting 223 & 230
Stantonite Composition 174a
Staples, Galvanized Wire . 185
Steam Engines. (See Engines).
„ Wagons. (See Wagons)
„ Hammers 538
„ Cranes 371-373
„ and Air Hose and Connections . 412
„ Traps . .. 124
Steel Balls, "Hoffmann's" 229
„ Bars, Hexagonal .. 267
„ „ Octagonal .. 267
„ „ Round 262 & 267
„ „ and Sections 253
„ „ Square 262 & 267
„ Beams or Joists 254-259
„ Chimneys 351
„ Drill for "Sullivan" Drills .. 412
„ Frame, Buildings 324-326

PAGE.
Steel Galvd. Corrugated Sheets 283
„ Plates 271
„ Sharpeners for "Sullivan" Drills .. 415
„ Sheets 271
„ „ Perforated .. 184
„ Spring 89
„ Tool 82
„ „ "Carbon" .. 87
„ „ Choice of .. 82
„ „ "Dolphin" .. 87
„ „ High Speed .. 83
„ „ "Imperial" .. 85
„ „ "K9. Oil Hardening" .. 86
„ „ Motor and Air Craft 86
„ „ Mining 88
„ „ Red Label .. 85
„ Towers 350
„ Work for Bridges .. 292f
„ „ „ Buildings 342-349
Stocks, Adjustable Die .. 6
„ Gas Die 4-5
„ "Virax" Die .. 7
„ "Whitworth's" Die 4-5
„ Taps and Dies .. 4-6
Stone Breakers .. 428-430
Stores, Country 174b
Straight Edges . .. 77
Straw 174b
Struts 288
„ Crippling Loads for 288
Sugar Cane Mills 703
„ Machinery 704
"Sullivan" Quarry Plant Machinery .. 406-413
Sulphur or Brimstone .. 174b
Surface Boxes 163
Suspension Bridges .. 310-311
Surface Gauges and Plates 77
Swage Blocks 61
Switches, Railway .. . 280
Swivel Bearings 223
Syphons, Oil Bayonet Top 138
„ Bull Ring, Pressure Gauge 129
„ Steel, Built Up .. 337
Syphons, W-I. Pressure Gauge 129

T.

Tachometers 135
Tallow Cups 138
Tan Gyro Centrifugal Pumps 708-713
Tanks and Cisterns .. 96a
„ Cast-Iron 236b
„ Iron and Steel 332-336
Tap Wrenches, Engineers' and Gas 5
Tape, Asbestos 175
„ Copper 211
„ Measuring 78
Tapping and Drilling Apparatus 168b

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

PAGE.

Taps, B. A. Thread .. 6
„ B. S. F. „ .. 6
„ Gas 5
„ "Whitworth's" .. 5
Tar Boilers 98
Tea Factory Buildings .. 329
Tee-iron 261-266
Tees, Mild Steel .. 261-266
„ W.-I. Pipe 157
Test Cocks 123
Testing Machine, "Buckton" 292g
„ „ Cement 53
Thimbles, Galvanized 110
Thrashers or Thrashing Machines 693
Tile Press 443
Tiles, Ridging .. 285
Tilting Furnace, "Morgan's" 542
Timber Trucks . 102
Timken Bearings . 247
Tin Block or Ingot 277
Tipping Wagons 101
Tobacco Machinery .. 704
Tool Steels 82
Tools, Boring .. 71
„ Carpenters' . 75-76
„ Diamond Dressing . 57
„ Emery Wheel Dressing 57
„ Grinding Wheel Dressing . 57
„ Knurling . .. 22
„ Lathe 18 20
„ Machine .. 537-617
„ Moulders . .. 58
„ Smith's . . 61
„ Valve Reseating . 80
Towers, Steel 350
Track, Railway, Portable .. 279
Traction Engines 462
Transformers: (See Electrical Index).
Travellers, Wall 32
„ Overhead .. 33
Traps, Steam . . 125-125
Tripod for Boring Plant . 70
Trolleys, Inspectors' . 103
„ Material . 91
„ Overhead Travelling 30
„ Railway Motor 386-387
Troughing Steel .. 272-276
Trucks, Brick 101
„ Heavy Material 91
„ Platform 90
„ Salt 102
„ Timber 102
„ Two-wheel Hand .. 92
Tube Brushes 79
„ Cutters 69
„ Expanders 13
„ Fittings 157
„ Vices 25
„ Wells 774-776
Tubes, Boiler 158
„ Boring 159
„ Brass 154

PAGE.

Tubes, Copper 154
„ Hydraulic 158
„ Wrought-Iron .. 155
Tubing, Flexible Metallic .. 167
Tubs, Coal Steel . .. 101
Tue Irons 60
Turbine Pumps 714, 720-723
Turnscrews . . . 75
Turnstile 189
Turntable, Motor Car .. 97
„ Railway 280 & 380
Turpentine . . 174b
Twine . . 174b
Twist Drills .. 14 15
Tyres Motor Car, "Pirelli" 243-244
Solid "Pirelli" 245-246

U.

Unions, G.-M. Steam 153
„ Socket, W.-I. Pipe 157
Users of Oil Engine 527

V.

Valve Reseaters 80
Valves, Air .. 149
„ Ball 147
Check .. 121
Equilibrium Water 148
Feed . .. 120
Fire . .. 163
Flap 149
Foot 148
Fullway . .. 118
Holding Up .. 148
Outlet Control .. 148
Pressure Gauge .. 128
Reducing 122
Reflux . . 148
Relief . . 149
Safety "Pop" . 121
"Ramsbottom" . 122
Sluice . 144
Stop 116
Vat, Indigo .. 667
Wheel 116-118
Varnish 183
Ventilators, "Archimedian" 213
"Venturi" Meters 140
Vacuum Pumps, "Sullivan's" 390, 401
Verandah Supports 201
Vertical Boilers, "Cochrane" 474-477
„ „ Cross Tube 480-482
Vices, Bench . . 24
„ Chain Pipe . . 25
„ Hand .. . 25
„ Handy Parallel .. 24
„ "Parkinson's" .. 23
„ Staple Leg 25
„ Tube 25
Victaulic Pipes and Joints 154a
Virax Die Stocks 7

PAGE.

W.

Wagons, Railway .. 238-241
Steam "Foden" 382, 385
„ Tank 240
„ Tipping . .. 101
„ Works and Jetty 102
Wall Boxes, Shafting .. 230
„ Brackets 230
Warehouses 316 318, 327-328
Washers, Ball Thrust .. 227
„ Galvanized .. 284
„ Groovers, Spring 216
„ Iron 284
„ Lead . .. 284
„ Limpet . . 284
"Waste-not" Cocks . 147
Water Boshes 60
„ Coolers . 532-536
„ Cranes . .. 143
„ Gauge Glass Cocks 126
Hammer Drills, "Sullivan" 409
„ Levels . .. 140
„ Meters 142
„ Paints 181
„ Purification Plant 793-794
Watering Carts 94
Wedges . .. 65
Weigh Beams .. 51
Weighbridges . 43-46
„ Cart .. 46
„ Railway 43-45
Weighing Machines, Cotton and Jute 48
„ „ Counter 52
„ „ Crane 51
„ „ Luggage 47
„ „ Pit Bank Coal 50
„ „ Platform 48-49
„ „ Sack .. 50
„ „ Sensitive 52
„ „ Warehouse 47-48
Weights . 53
„ of Bolts and Nuts 282
„ „ Flat Steel . 268
„ „ Hexagonal Steel 267
„ „ Octagonal „ 267
„ „ Pipes, C.I. and Specials 150-153
„ „ Pipes, W.-I. and Fittings . 156
„ „ Rivets 281
„ „ Round Steel .. 267
„ „ Square „ . 267
Well Curbs 292h
Wheel Barrows .. . 92
Wheels, Cast Steel .. 99
„ Emery 54-56
„ Gear 236
„ Grinding . 54-57
„ Pressed Steel .. 100
„ Punkha 213
„ Truck 90

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

INDEX

PAGE.

Whistles, Steam 136
"Whitworth's" Stocks and Dies 4-6
" Taps .. 5
Winches, Crab 31
" Steam .. 369-370
Winding Engines .. 364-367
Wing Compasses 76
Winnowers 695
Wind Ties, Galvanized . 270
Wire, Barbed .. . 185
"Wizard" Kerosene Engine 529-531

Wire Brushes 79
" Cloth . .. 184
" Fencing, Barbed .. 193
" " Plain .. 191
" " Galvanized 191

PAGE.

Wire Galvanized, Plain .. 185
" " Strand .. 185
" Gauges 78
" Nails 216
" Ropes 104-108
" Steel Spring 185
" Brass 185
"Wizard" Pumping Sets . 730
Woodworking Machinery 618-631
" Machine Shop Layout 630-631
Workshop Buildings 320-323
Work Benches, "Pioneer" 24
Works, Our Garden Reach 237-241 & 292e
" Howrah . 292a-e
" Jamshedpur .. 338

PAGE.

Wrenches, Chain Pipe .. 68
" Coach 67
" Engineers' Tap 5
" Footprint .. 77
" Iron Box .. 120
" Pipe 68
" "Stillson's" .. 68
" Tube Cutter and Pipe 69

Y.

Yarn, Asbestos 175
" Dressers . .. 633

Z.

Zinc 277
" Sheets 277

Electrical Plant Apparatus and Appliances.—See Separate Electrical Department Index.

INDEX.

ELECTRICAL DEPARTMENT.

PAGE.

A.

Accessories 855-859
Adaptors 859
Automatic Centrifugal Clutch 817
Alternating Current Motors 815
Alternators, Turbo, Lancashire 796-797
Ammeters 828
Ammeter Battery Charging 862
„ Pocket Type .. 862
„ Switchboard Type 862
Apparatus, Cooking .. 867
„ Heating .. 867

B.

Batteries, Bell 864
„ Motor Car .. 865
„ Storage 824
„ „ Cells .. 825
Battery Charging Generators 813
„ „ Plant .. 819
„ „ Switchboards .. 823
Bell Pushes 866
Bells 866
Blasting Machines 864
Blocks, Carbon, "Le Carbone" 835
„ Wooden 852
Boards, Teakwood .. . 852
„ Distribution .. 855
Boxes, Durex 850
Brackets, Brass Lamp .. 844
„ Canting 844
„ Pilot Light, Swan Necked .. 823
„ "Striplite" Music Desk 844
„ Movable 844
„ Mirror 844
„ Pole 846
„ Wall 846
Breakers, Circuit 826 & 834
Brushes, Carbon, for Fans 835
„ „ „ Motors 835
Button, Push 826

C.

Cables 853
„ Flexible 853
Cable Sockets, Copper .. 833
Carbons, Solid 835
„ Blocks and Pencils, "Le Carbone" 835
„ Brushes for Fans 835
„ „ „ Motors 835
„ Metal Cored Flame 835
„ Arc Lamp .. 835
Cargo Clusters 840
Casing and Capping .. 852
Ceiling Roses 856
„ Rose, Durex .. 850
Chatterton Compound .. 859
Circuit Breakers 834
Clamps, Pole 841

PAGE.

Clusters, Cargo 840
Clutch, Automatic Centrifugal 817
„ „ Speeds and Powers 818
Cranes, Jetty 804
„ Runabout Electric 805
Cleats, Porcelain 856
Cloth, Empire 859
„ Micanite 859
Conduits and Fittings .. 848
Contactors 826
Conversion Factors 873
Cooking Apparatus .. 867
Copper, Standard for .. 870
„ Braided Flexible Wire .. 835
Copper Cable Sockets .. 833
Cut-in 834
Cut-outs 856
„ Automatic 834
„ Durex 849

D.

Direct Current Generators 813
„ „ Machines .. 812
„ „ Motors .. 814
„ Standard Switches 830
Distribution Durex Boards 849
„ Boards, Diaduct 851
„ „ House Service 855
Drip Proof Motors 812
Drivers, Junior Planer .. 803
„ Planer 802
Durex Fittings .. 849-850

E.

Ebonite Rod 859
"Electolite" Generating Set 822
Electrical Plant, Apparatus and Appliances .. 795-873
Electric Transport Methods 804
Exhaust Fans 837

F.

Fans, Ceiling, Alternating Current .. 836
„ „ "Phenix Saxon" .. 836
„ „ Revo D.C. 836
„ „ "Phenix "Selco"
„ Exhaust 837
„ Table, Fixed Type, A.C. & D.C. 837
„ „ Oscillating D.C. . 837
Fan Regulators 836
Fibre Rod, Red 859
Flat Irons 867
Floor and Table Standards 842
Field Regulator 826
Fittings, Conduit 848

PAGE.

Fittings, "Dugdrills" Patent Movable . 844
„ "Durex" .. 849-850
„ Saloon, Ships' .. 840
„ Weatherproof .. 841
Fuses, House Service Type, Ironclad .. 832
„ Ironclad, Foolproof 832
„ „ „ Interlocked with Switch and Plug 832
„ for Switchboard Mountings 833
Fuse Wire, Tables 873

G.

Gas Projections 841
Gauges, Wire, in Common Use 873
Generating Sets, Kerosene 822
Generators, Battery Charging 813
„ Direct Current 813
„ Motor Driven Planting, "Canning" 821
Goods Service Lifts .. 801

H

Hand Lamps for Mills, Collieries and Workshops 839
Holders, Lamp .. . 845
Heating Apparatus . .. 867

I.

Indicators, Bell .. . 866
„ Pole 862
Induction Motors 812
Installation Fittings . 855
Insulators, Bobbin . 861
„ High Tension .. 860
„ Low „ .. 860
„ Rack . . 861
„ Reel 861
„ Shackle . .. 860
„ Telephone .. 860
Irons, Laundry 867

J.

Jetty Cranes 804
Jugs, Hot Water .. . 867
Junction Boxes, "Durex" 850

K.

Kettles .. . 867
Keys, Bell Ringing . .. 866

L.

Lamps, Carbon Filament .. 839
„ Double Contact for Motor Cars .. 838
„ Hand 839
„ Half Watt 838
„ Metal Filament .. 838
„ „ „ Twisted Flame 839

PAGE.
Lamps, Radiator 867
„ Table Standard .. 842
Lamp Holders 845
„ Shades 845
Laundry Irons 867
Leatheroid 859
Lifts, Goods Service .. 801
„ Passenger Service .. 799
„ Users of 800
Lightning Arresters .. 847
Locomotive, Electric .. 804

M.

Machines, Blasting .. 864
„ Direct Current 812
Metal Cored Arc Lamp Flame Carbons 835
Meters, Moving Coil .. 823
„ House Service .. 863
Megger Testing Sets .. 862
Motors, Alternating Current 815
„ Direct Current .. 814
„ Drip Proof 812
„ Enclosed Ventilated 812
„ Forced Draught .. 812
„ Geared 812
„ Induction 812
„ Pipe Ventilated .. 812
„ Protected 812
„ Squirrel Cage .. 815
„ Synchronous .. 798
„ Totally Enclosed .. 812
„ Vertical Spindle .. 812
„ Wound Rotor .. 815

O.

Ohmaline Varnish 859

P.

Panels, Standard 828
Passenger Service Lifts .. 799
Pencils, Carbon 835
Pendants 843
"Phœnix" Motor Driven Pump 820
Pillars, Vauxhall Control 826, 827
Pipe, Ventilated Motors .. 812
Planer Drives 802
„ „ Junior .. 803
Plates, Boiling 867
Plug, Adapters 859
Plugs, Clincher 852
„ Durex 849
„ Two Pin 858
„ Wall 858
„ Watertight, Admiralty 858
Poles 846
Pole Clamps 841
„ Brackets 846
„ Finders 862
Presspahn 859
Protected Motors 812
Projections, Gas 841
Pulley, Automatic Centrifugal Clutch .. 816-818
Pumps, "Phœnix" Motor Driven House Service . 820
Pumps, "Tan-Gyro" .. 821

PAGE.
Push Button . 826
Pushes, Bell . 866

R.

Radiators 867
Reflectors, Shell and Holder 823
Regulator for Fans .. 836
„ Field 826
„ Shunt 826
Reversing Switches .. 830
Rotary Transformer .. 819
Runabout Cranes, Electric 805

S.

Salamoniac 864
Saloon Fittings, Ships' . 840
Shades for Lamps 845
Shadolite Lacquer 839
Shunt Regulator 826
Sleeves, Cotton Braided .. 859
Sockets, Cable, Copper .. 833
Special Features of Planer Drives 802
Squirrel Cage Motors .. 815
Standards, Floor and Table 842
Standard Panels 828
Stay Rods 846
„ Swivels 846
Starters 815
„ Auto Transformer 815
„ Air Break 830
„ Standard D.C. Motor 829
„ Star Delta .. 815-830
„ Vauxhall 826
„ Combined Stator & Rotor 831
Storage Batteries 824
„ Battery Cells .. 825
Striplite 844
Suspenders 841
Switchboards, Battery Charging 823
Switchboards, Mountings, Fuses for 833
Switch and Fuse Street Lighting 847
Switch Gear 816
„ „ Panels .. 828
„ Direct Starting .. 828
„ Durex 849
„ Float 834
„ Ironclad 832
„ „ Foolproof 832
„ „ Interlocked with Fuse and Plug 832
„ Knife 833
„ Isolating 826
„ Reversing 830
„ Combined with Plugs 857
„ Tumbler 857
„ „ Coupled ..
„ D.P. 857
„ Pear 857
„ Slipper 857
Synchronous Motors, Lancashire 798

PAGE.

T.

Table Fans, Fixed Type, A.C and D.C. 837
Table Fans, Oscillating D.C. 837
Table Standard 842
Tan-Gyro Motor Driven Pump 821
Tape, Egyptian 859
„ Empire 859
„ Black 859
„ Okonite 859
„ Pure Rubber .. 859
Tapers, Morse 866
Technical Data .. 868-873
Testing Sets, Megger .. 862
Transformers, Rotary Battery Charging .. 819
„ "Berry" 808, 809
„ „ Output Factors 811
„ "Berry" Radial 811
„ Price List .. 810
Transport Methods, Electric 804
Trucks, Electric, "Orwell" 807
Tubes, Wall, Porcelain .. 861
Turbo Alternators, "Lancashire" 797,798

U.

Users of Lifts 800

V.

Varnish Ohmaline 859
Vauxhall Pillars .. 826, 827
„ Starters 826
Vehicles, Electric, "Orwell" 806
Voltmeters, Battery Charging 862
„ Pocket Type .. 862
„ Switchboard Type 862

W.

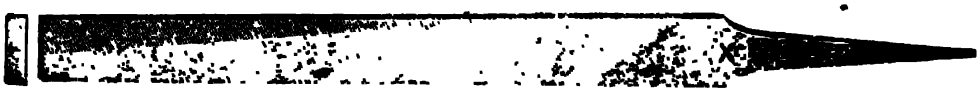
Wall Brackets 846
„ Plugs 858
„ Shoes 858
, Tubes, Porcelain .. 861
Weather-proof Fittings .. 841
Winches 847
Wire Bell 866
„ Conductors B.S.S. .. 869
„ Copper 855
„ „ B.S.S. .. 868
„ „ Braided for Brushes .. 835
„ Cotton Covered .. 854
„ Enamelled 854
„ Eureka 854
„ Flexible 853
„ Fuse, Tables for .. 873
„ Gauges 873
Motor, Flexible .. 855
„ Nickel Chrome, Resistance of .. 871
„ Resistance .. 854
„ Silk Covered .. 854
„ Steel Binding 855
„ Tin Fuse .. 854
„ Workshop Flexible 853
Wires and Cables .. 853

Files.

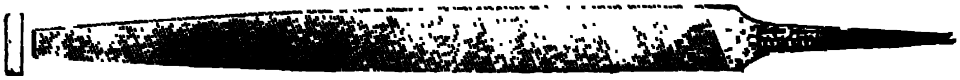
Made of Best Quality of Material which gives them strength and renders them available as Tool Steel when worn out as files. **Hardness and Thoroughness of Temper** make them long lived as files. **Keenness of Teeth** makes them cut easily and smoothly. **Uniformity of Quality and Finish** always secures same results. **They do the most work** in the **least time** with the **least effort,** and **last longest.**

Fully Guaranteed.

Hand Files.



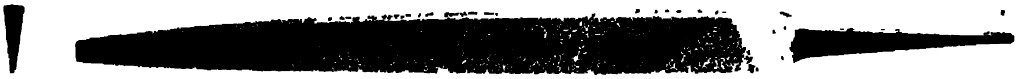
Flat Files.



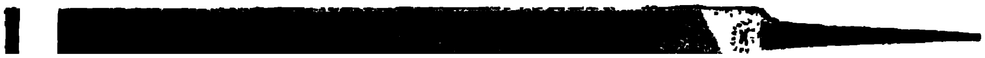
Feather Edge Files.

Ward Files.

Knife Edge Files.

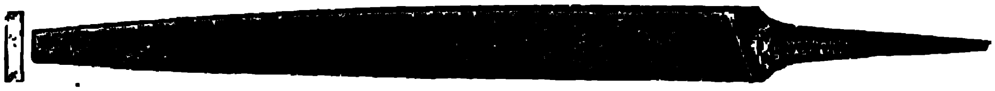


Mill Saw Files.

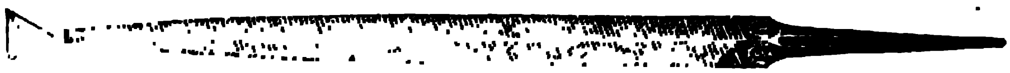


Files.

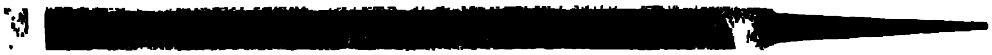
Mill Saw Files.



Three-Square Files.

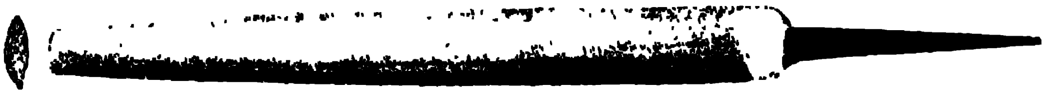


Pillar Files.

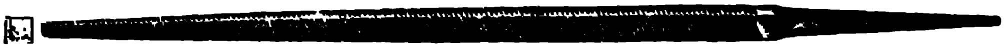


Half-Round Files.

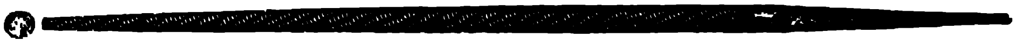
Fish Back or Crossing Files.



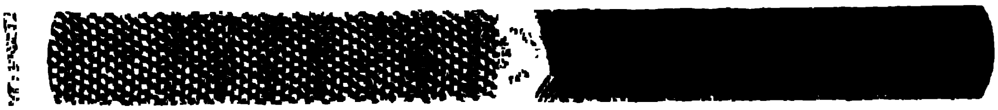
Square Files.



Round Files.



Flat Rasp.



Price List of Files.

Flat, Round and Square.

Size			4	6	8	10	12	14	16	18
Rough and Bastard	per doz.	Rs.	3 1	3 15	4	6 9	8 13	12	17 10	24
Second Cut ..	„	„	3 10	4 15	8	7 12	9 13	13	19 4	
Smooth ..	„		4 3	5 8	4	8 13	10 14	14 12	21 4	.

Half-Round, Hand, Three-Square and Cotter.

Size		ins.	4	6	8	10	12	14	16
Rough and Bastard .	per doz.	Rs.	3 12	5 8	7 4	8 6	10 10	14 12	20 8
Second Cut	„	„	4 5	6 0	8 4	9 12	11 12	16 0	22 8
Smooth	„	„	5 1	6 13	8 14	10 7	12 14	17 3	25 14

Saw Files.

Size .		ins.	6	7	8	10	12
Mill Saw Bastard	per doz.	Rs.			5 12	7 0	9 8
Mill Saw Second Cut				.	7 0	8 4	.
Topping Safe Edge				..	8 8		
Hand Taper Saw			4 3	5 5	6 8		

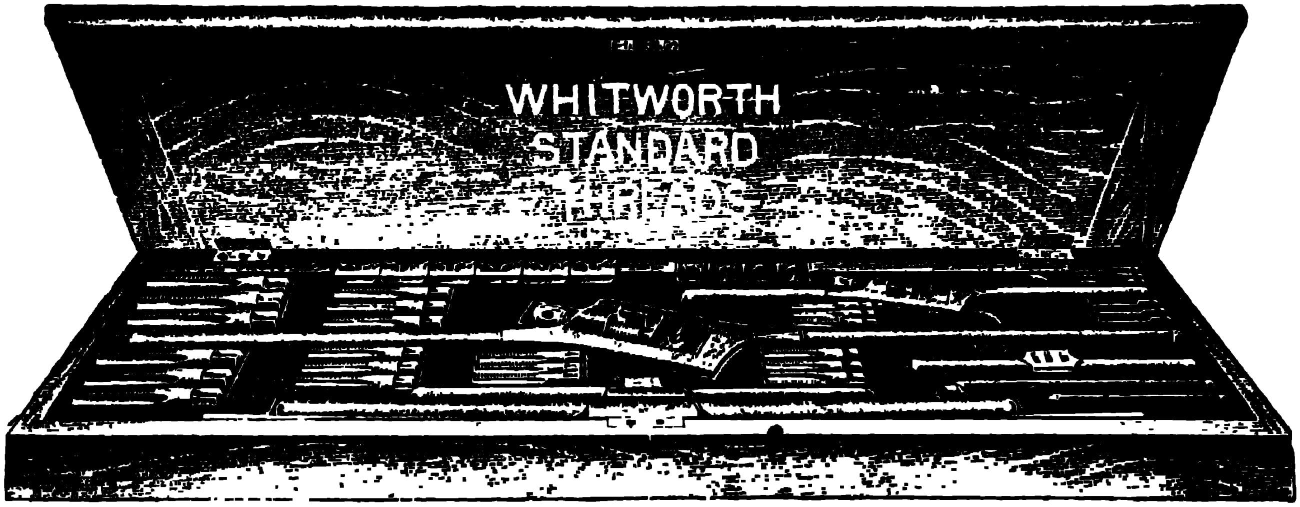
Miscellaneous Files and Rasps.

Size		.. ins.	12	14	16
Fish Back Bastard ..	per doz.	Rs.	16 0	22 8	30 4
Fish Back Second Cut	„	„	17 12	24 8	33 8
Flat Horse Rasps ..	„	„	..	14 12	
Half-round Rasps ..	„	„	10 10	14 12	

Block Files	6"×1"	Rs. 64 per doz.
	6"×2"	„ 112 „

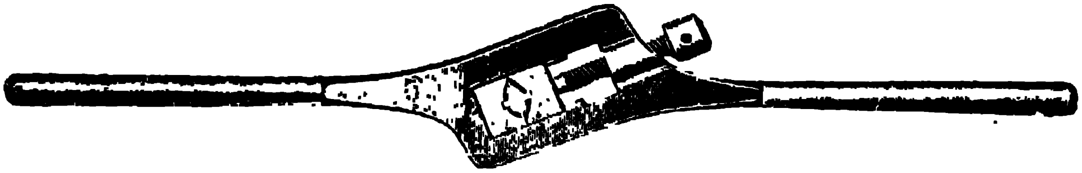
File Handles	per doz.	Rs.	1 4
„ Carding on Cloth	„ foot	„	0 8
„ Brushes	„ doz.	„	12 0

Stocks, Taps and Dies.



Set of Stocks, Taps and Dies, Whitworth's with Plug, Second, and Taper Taps and Tap Wrenches, in Teakwood Box, complete.

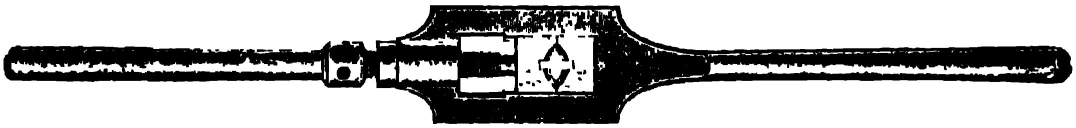
To Screw	Ins.	¼ ⅜ ½ ⅝ ¾ ⅞ 1	Rs. 195
"	"	¼ 5/16 ⅜ 7/16 ½ ⅝ ¾ ⅞ 1	" 210
"	"	¼ ⅜ ½ ⅝ ¾ ⅞ 1 1⅛ 1¼	" 298
"	"	¼ 5/16 ⅜ 7/16 ½ ⅝ ¾ ⅞ 1 1⅛ 1¼	" 325
"	"	¼ ⅜ ½ ⅝ ¾ ⅞ 1 1⅛ 1¼ 1⅜ 1½	" 456
"	"	¼ 5/16 ⅜ 7/16 ½ ⅝ ¾ ⅞ 1 1⅛ 1¼ 1⅜ 1½	" 475
"	"	1¼ 1½ 1¾ 2	" 485



Stocks with Dies, Taper and Plug Taps to each size, Whitworth's.

To Screw	Ins.	¼ 5/16 ⅜	Rs. 29
		¼ 5/16 ⅜ 7/16 ½	" 40
		½ ⅝ ¾	58
		⅝ ¾ ⅞ 1	72

To Screw	Ins.	⅞ 1 1⅛ 1¼	Rs. 106
"	"	1⅛ 1¼ 1⅜ 1½	" 151
"	"	1½ 1¾ 2	" 226
"	"	1⅝ 1¾ 1⅞ 2	" 290



Stocks with Dies, Taper and Plug Taps to each size, Gas.

To Screw	Ins.	¼	⅜	½		Rs. 34
"	"	⅝	¾	1		" 52
"	"	1¼	1½	2		" 185
"	"	1¼	1½	1¾	2	" 230
"	"	2¼	2½	3		" 372

When ordering spare Dies, please specify the range of sizes used in the same Stock.

Taps and Dies.

Taps, Whitworth's Thread.

Size .. Ins.	3/16	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2
Taper, Second, Plug, each Rs.	1-2	1-2	1-3	1-5	1-8	1-11	2-4	2-12	3-10	4-7	5-8	7-2	9-8	11-8	14-6	17-12	21-8	26-0
Master ,, ,,	1-15	2-1	2-4	2-8	2-12	3-5	4-2	5-4	6-10	8-4	10-3	12-10	15-8	18-12	23-4	28-12	35-4	43-0
Machine ,, ,,	..	1-14	2-2	2-2	2-8	3-0	3-12	5-0	6-4	8-4	10-12	13-8	17-4	21-8	26-0	30-4	35-12	41-0

Taps, Gas Thread.

Size Ins	⅛	¼	⅜	½	¾	1	1¼	1½	1¾		2¼	2½	2¾	
Taper, Second, Plug, each Rs	1-6	1-11	2-4	2-12	3-5	4-6	7-2	10-8	15-4	20-8	25-14	33-0	42-0	50-0
Master ,, ,,	2-12	3-8	4-4	5-0	5-12	8-8	11-12	16-12	23-8	32-8	42-0	55-12	67-4	84-0

Dies, Whitworth's Thread.

Size Ins.	¼, 5/16, ⅜, 7/16, ½	⅝, ¾, ⅞, 1	1⅛, 1¼, 1⅜, 1½	1⅝, 1¾, 2
Price, per pair .. Rs	2-12	5-8	10-8	14-8

Dies, Gas Thread.

Size Ins	¼, ⅜, ½	⅝, ¾, ⅞, 1	1¼, 1½, 1¾, 2	2¼, 2½, 2¾, 3
Price, per pair .. Rs.	3-8	5-8	14-14	22-0

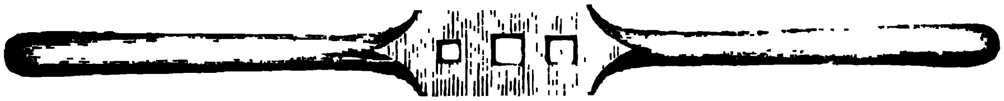
Stocks for Whitworth's Dies.

Size Ins.	¼ to ½	⅝ to 1	1⅛ to 1½	1⅝ to 2
Price, each Rs.	12-14	25-4	45-0	73-0

Stocks for Gas Dies.

Size Ins.	¼ to ½	⅝ to 1	1¼ to 2	2¼ to 3
Price, each Rs.	14-0	26-8	64-12	100-0

Tap Wrenches.



Engineers' with Case-Hardened Holes.

Size .. .. Ins.	¼, 5/16, ⅜	⅜, 7/16, ½	½, ⅝	⅝, ¾	⅞, 1	1⅛, 1¼	1⅜, 1½	1½, 1⅝, 1¾	1¾, 1⅞, 2
Price each .. Rs.	3-12	4-8	5-14	7-6	9-6	12-6	17-12	23-0	29-6

Gas Fitters' with Case-Hardened Holes.

Size .. .. Ins.	¼, ⅜, ½	½, ¾, 1	1, 1¼, 1½	1½, 1¾, 2, 2¼	2¼, 2½	2½, 3
Price, each .. Rs.	7-6	12-6	31-0	34-0	38-8	44-12

Taps and Dies.

Taps, British Standard Fine Thread (B. S. F. Std.).

Size		3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
Taper Plug	each Rs.	0-13	1 0	1 3	1-5	1-10	1-14	2-9	3-6	4-8	5-10

Taps, British Association Threads (B. A.).

Size	Nos.	0	1	2	3	4	5	6	7	8	9	10
Taper Plug	each Rs.	1-0	1-0	1-0	1-0	1-0	1-0	1-0	1-0	1-0	1-3	1-3

Adjustable Dies, British Standard Fine Thread.

Size of Die	Cutting Sizes.	Price, each.
13/16 ins. dia.	3/16, 1/4, 5/16 ins.	Rs. 2-12
1 " "	3/16, 1/4, 5/16, 3/8, 7/16 ins.	" 3 8
1 5/16 " "	3/16, 1/4, 5/16, 3/8, 7/16, 1/2 ins.	" 5-4
1 9/16 " "	1/4, 5/16, 3/8, 7/16, 1/2 "	" 6-6
1 3/4 " "	3/8, 7/16, 1/2, 5/8, 3/4 ins.	" 8 8
2 1/4 " "	1/2, 5/8, 3/4, 7/8, 1 ins.	" 12-12

Adjustable Dies, British Association Threads.

Size of Die 13/16 in.

Cutting Size		0	1	2	3	4	5	6	7	8	9	10
Price, each	**Rs.**	2-12	2 12	2-12	2 12	2-12	2-12	2-12	3-4	3 4	3-4	3-4

Stocks for Adjustable Dies.

Nos.		1	2	3	4	5	6
Takes Dies	Ins.	13/16	1	1 5/16	1 9/16	1¾	2¼
Price, each	**Rs.**	2-12	4-8	5-8	6-12	9-0	12-0

Sets of Stocks, Taps and Dies, in well finished Wooden Cases.

British Standard Fine Thread. Case contains one each Taper and Plug Taps and one Die to each size as follows

Cutting Size— 3/16 1/4 5/16 3/8 7/16 ½ R. H.

One Die Stock No. 1 for Dies 3/16 to 5/16 in. One Die Stock No. 3 for Dies ⅜ to ½ in.

One Adjustable Tap Wrench for Taps to 5/16 in. One Solid Tap Wrench for ⅜ in. Taps.

One Double Hole Solid Tap Wrench for 7/16 and ½ in. Taps. One Screwdriver.

Price, per set, Rs. 72.

British Association Threads. Case contains one each Taper and Plug Taps and one Adjustable Die to each size as follows:

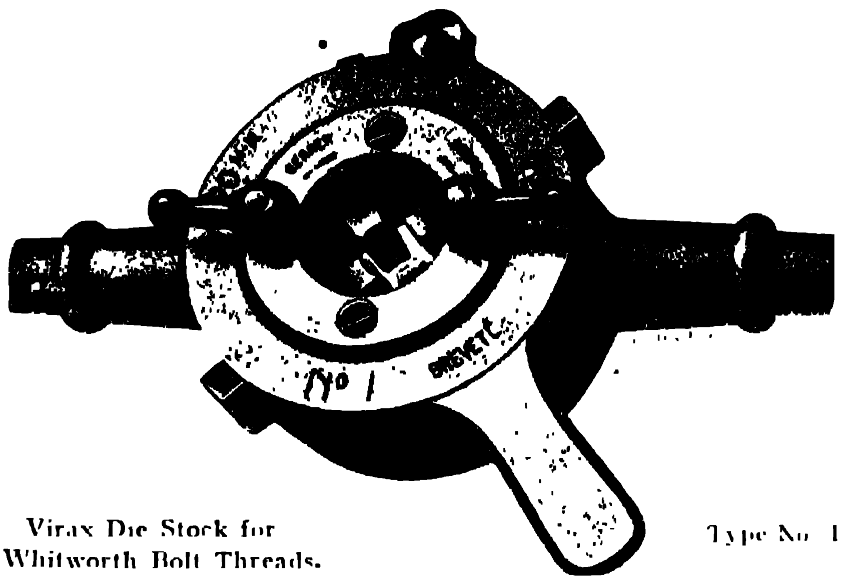
Cutting size, B. A. Nos. 0 2 4 6 8 10

One No. 1 Stock. One Adjustable Tap Wrench.

One Screwdriver. **Price, per set, Rs. 42.**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

Virax Adjustable Die Stocks.



Virax Die Stock for Whitworth Bolt Threads. Type No. 1

The Virax Die Stock is extremely easy to handle, even the least skilled workman being able to produce perfect results by following the simple instructions provided with each tool.

Chasers can be changed in a few seconds without the use of any tool, nor is it necessary to dismantle any part of the die stock.

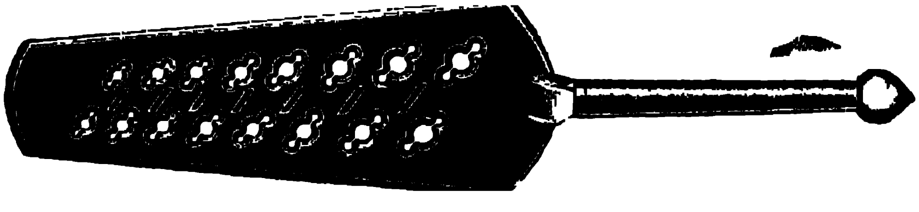
All parts are interchangeable.

The die head is fitted with an adjustable stop for use when threading a number of parts of the same diameter, enabling the operator to automatically reset the dies at exactly the same size each time.

Type.	Thread.	Range.	Set of Chasers.	Set of Taper & Plug Taps.	Price, Rs.
1	Metric S. I. ..	7-20 m/m	6		70 0
2	Whitworth	1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 3/4", 7/8", 1"	7		58 0
2A	Do.	Do. do with taps	7	10	95 0
3	Gas	1/4", 3/8", 1/2", 3/4", 1"	3	-	32 0
4	Do.	1", 1 1/4", 1 1/2", 2"	2	-	65 0
4A	Do	1/2", 3/4", 1", 1 1/4", 1 1/2", 2"	3	-	70 0
5	Do	2 1/4", 2 1/2", 3"	1		108 0
6	Do.	1 1/2", 2", 2 1/4", 2 1/2", 3"	2	—	115 0
7	Do.	2 1/4" to 4"	2	-	140 0

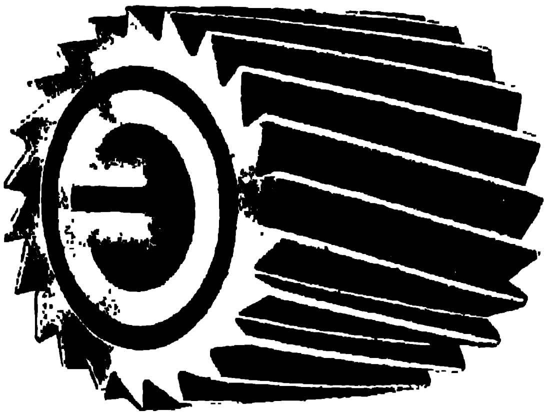
Single-Hand Screw Plates.

Complete with Taps.



No. of holes	7	8	14	16
Range	1/16" to 1/4"	1/16" to 5/16"	1/16" to 1/2"	1/16" to 9/16"
Price, each .. .. Rs.	13 0	14 8	21 12	27 0

Plain Milling Cutters.



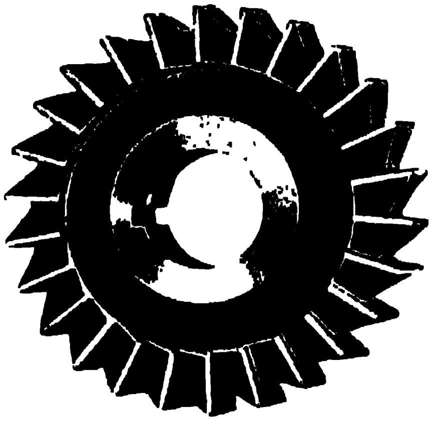
Plain, with Straight or Spiral Teeth.

Cutters of less than ¾ in. face have straight teeth. Over ¾ in. the teeth are spiral.

Larger sizes and others not listed will be quoted on application.

Diam.	Width of face.	Hole	Carbon Steel.		High Speed Steel.	
			Price,		Price,	
In.	Ins.	Ins.	Rs.	A.	Rs.	A.
2½	½	1	9	12	13	8
2½	⅝	1	10	4	16	0
2½	¾	1	11	12	19	0
2½	⅞	1	13	0	21	0
2½	1	1	13	12	24	0
2½	1¼	1	15	8	26	0
2½	1½	1	16	12	28	0
2½	1¾	1	18	4	30	0
2½	2	1	20	0	32	0
2½	2½	1	22	0	37	0
2½	3	1	23	12	42	0
2½	3½	1			45	0
2½	4	1	29	4	50	0
3	½	1¼	13	0	16	8
3	⅝	1¼	14	8	19	0
3	¾	1¼	16	0	20	8
3	⅞	1¼	17	8	24	0
3	1	1¼	19	0	27	0
3	1¼	1¼	21	4	30	0
3	1½	1¼	22	12	34	0
3	1¾	1¼	23	12	36	0
3	1⅞	1¼	....		38	0
3	2	1¼	25	0	41	0
3	2½	1¼	27	8	45	0
3	3	1¼	29	4	54	0
3	3½	1¼	31	4	..	
3	4	1¼	34	0	68	0
3	5	1¼	41	4	...	
3	6	1¼	57	0	....	
3½	½	1¼	16	12	21	0
3½	⅝	1¼	18	8	22	0
3½	¾	1¼	20	8	26	0
3½	⅞	1¼	23	4	28	0
3½	1	1¼	25	8	32	0
3½	1¼	1¼	....		34	8
3½	1½	1¼	29	8	39	8
3½	1¾	1¼	....		43	0
3½	1⅞	1¼	..		48	0
3½	2	1¼	34	0	. .	
3½	2½	1¼	36	8	57	0
3½	3	1¼	39	4	63	0
3½	3½	1¼	43	4	....	
3½	4	1¼	48	6		
3½	4	1½	.		....	
4	½	1¼	21	0	25	8
4	⅝	1¼	22	12	28	8
4	¾	1¼	25	0	31	0
4	⅞	1¼	27	8	34	0
4	1	1¼	30	0	37	0
4	1	1½	30	0	...	
4	1¼	1¼	33	0	...	
4	1¼	1½	33	0	...	
4	1½	1¼	35	0	....	
4	1½	1½	35	0	....	
4	1¾	1¼	37	8	....	
4	1¾	1½	37	8	61	0
4	2	1¼	39	8	..	
4	2	1½	39	8	85	0
4	3	1¼	47	12	85	0
4	3	1½	47	12	93	0
4	3½	1¼	...		95	0
4	3½	1½	....		110	0
4	4	1¼	58	8	110	0
4	4	1½	58	8	130	0
4	5	1½	71	4	140	0
4	6	1½	82	0	32	0
4½	½	2	21	4	34	0
4½	⅝	2	23	8	36	0
4½	¾	2	25	6	42	0
4½	⅞	2	28	0	44	0
4½	1	2	31	4	51	0
4½	1¼	2	36	0	60	0
4½	1½	2	39	8	65	0
4½	1¾	2	43	8	75	0
4½	2	2	45	0	....	
4½	6	2	103	0	. ..	

Side and Face Milling Cutters.



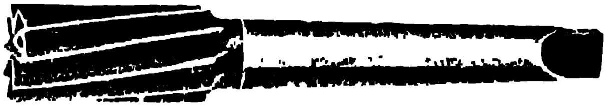
These Cutters are frequently used in pairs for sizing nuts, bolt heads, etc., and when so used are called "Straddle Mills." They have teeth on face and both sides.

Prices for other sizes on application.

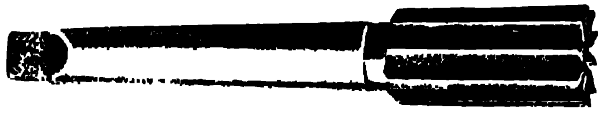
Dia.	Width of Face	Hole	Carbon Steel		High Speed Steel		Dia.	Width of Face	Hole	Carbon Steel		High Speed Steel		Dia.	Width of Face	Hole	Carbon Steel		High Speed Steel	
Ins.	Ins.	Ins.	Rs.	A.	Rs.	A.	Ins.	Ins.	Ins.	Rs.	A.	Rs.	A.	Ins.	Ins.	Ins.	Rs.	A.	Rs.	A.
2½	¼	⅞	11	12	16	0	3	[illegible]	1	18	0	23	0	4	⅜	1	34	8	45	0
2½	5/16	⅞	13	4	17	0	3½	¼	1	20	0	24	0	5	⅝	1	30	8	52	0
2½	½	[illegible]	14	4	19	0	3½	⅜	1	22	8	26	0	5	¾	1 or 1¼	33	12	56	0
2¾	¼	⅞	12	0	17	8	3½	⅜	1	23	4	28	0	5	[illegible]	1	36	8	61	0
2¾	⅜	[illegible]	14	4	20	0	3½	⅝	1	24	4	32	0	5	1	1	41	4	65	0
2¾	½	[illegible]	14	8	21	0	4	½	1	27	8	36	0	6	¾	1	40	4	74	0
3	¼	1	13	4	19	8	4	⅝	1 or 1¼	29	8	39	0	6	[illegible]	1¼	42	12	80	0
3	[illegible]	1	16	0	21	0	4	¾	1	32	0	42	0	6	1	1¼	46	0	87	0

End Mills, Straight or Spiral Cut.

Morse Taper Shanks.



Spiral Cut.

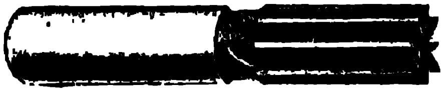


Straight Cut.

In ordering please state whether right or left hand mills are wanted. Also give number of shank.

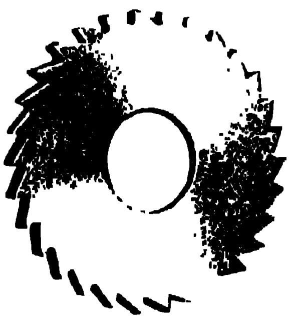
Diam.	No. of Morse Taper	Length of Cut.	Total Length	Carbon Steel		High Speed Steel		Diam.	No. of Morse Taper	Length of Cut	Total Length	Carbon Steel.		High Speed Steel.	
Ins.		Ins.	Ins.	Rs.	A.	Rs.	A.	Ins.		Ins.	Ins.	Rs.	A.	Rs.	A.
¼	1	¾	3¾	6	0	7	0	1	3	1¾	6⅛	12	4	15	0
5/16	1	⅞	3⅞	6	0	7	8	1⅛	3	1⅞	6¼	12	8	17	8
⅜	1	⅞	3⅞	6	4	8	0	1¼	3	2	6⅜	13	4	21	0
7/16	1	1	4	6	8	8	8	1⅜	3	2⅛	7⅝	15	0	30	0
½	1	1	4	7	0	9	0	1½	4	2¼	7¾	16	4	33	0
9/16	2	1⅛	4¾	7	12	9	8	1⅝	4	[illegible]	7⅞	18	0	39	0
⅝	2	1¼	4⅞	8	4	9	12	1¾	4	2⅜	7⅞	20	0	42	0
11/16	2	1⅜	5	9	8	10	0	1⅞	4	2½	8	22	8	48	0
¾	2	1½	5⅛	9	12	10	8	2	4	2½	8	25	0	55	0
⅞	2	1⅝	5¼	11	4	12	0								

Straight Shank End Mills.



Diameter.	Length of Cut	Price, each		Diameter	Length of Cut.	Price, each.	
		Carbon Steel.	H. S. Steel			Carbon Steel.	H. S. Steel.
Ins.	Ins.	Rs A	Rs. A.	Ins	Ins.	Rs. A	Rs. A
⅛	⅜	1 0	4 4	⅝	1¼	4 0	7 8
¼	¾	1 8	4 12	¾	1½	4 12	8 12
⅜	⅞	2 0	5 12	⅞	1⅝	5 8	10 8
½	1	3 0	7 0	1	1¾	6 8	12 0

Prices for other sizes on application.



Metal Slitting Saws.

Concave Sides.

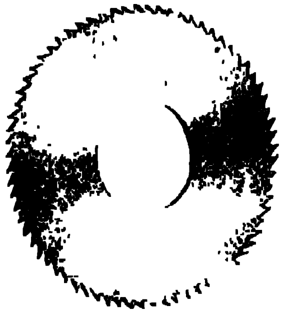
These are thin Milling Cutters ground on the sides and left a little thicker at the outer edge than near the centre to give proper clearance in cutting deep slots.

In ordering special saws please state for what purpose they are required.

Prices for sizes other than those given below on application.

Diameter.	Thickness	Hole.	Carbon Steel	H. S. Steel	Diameter.	Thickness	Hole.	Carbon Steel.	H. S. Steel
Ins	Ins	Ins.	Rs. A	Rs. A.	Ins.	Ins	Ins	Rs. A.	Rs A
2½	1/16	⅞	4 8	5 0	5	1/16	1	12 0	14 0
2½	⅛	⅞	5 8	6 8	6	1/16	1	10 0	13 8
3	1/16	1	5 0	6 0	6	⅛	1	13 0	15 0
3	⅛	1	6 0	6 8	6	1/16	1	15 0	18 0
4	1/16	1	6 4	7 0	7	1/16	1	12 0	21 0
4	⅛	1	8 0	9 0	7	⅛	1	16 0	18 0
4	3/16	1	9 8	10 8	7	1/16	1¼	18 0	22 0
5	1/16	1	8 0	10 8	8	⅛	1¼	18 0	22 8
5	⅛	1	10 0	11 8	8	1/16	1¼	20 4	28 0

Screw Slotting Cutters.



These Cutters have a fine pitch of teeth especially adapted for the slotting of screw heads and similar work. They are not ground on the sides.

Cutters 2¾ ins. dia. have 72 teeth, 2¼ ins dia. 60 teeth and 1¾ ins. dia 90 teeth.

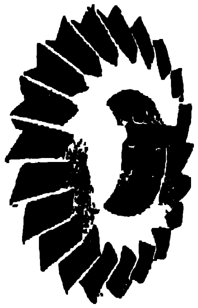
Prices for 2¼ and 1¾ ins. dia. Cutters on application.

Thickness of Cutter. Gauge No.	Diam	Size of Hole	Carbon Steel.	Thickness of Cutter. Gauge No.	Diam	Size of Hole.	Carbon Steel.
	Ins.	Ins.	Rs. A		Ins	Ins.	Rs. A.
5	2¾	1	3 12	11	2¾	¾ & 1	1 12
6	2¾	1	3 4	12	2¾	¾ & 1	1 8
7	2¾	1	2 12	13	2¾	¾ & 1	1 4
8	2¾	¾ & 1	2 8	14	2¾	½, ⅝, ¾ & 1	1 4
9	2¾	¾ & 1	2 0	15-34	2¾	½, ⅝, ¾ & 1	1 0
10	2¾	¾ & 1	2 0				

Angular Cutters.

Double Angle Cutters.

The angle being equal on each side of the centre line 45°, 60° or 90° included angle.



Diam	Thickness	Hole	Carbon Steel	High Speed Steel
Ins			Rs. A.	Rs A.
			14 8	19 0
			15 8	21 0
			18 8	24 0
			22 8	29 0
			30 0	36 0
			38 8	47 0

Right or Left Hand Angular Cutters

45°, 50°, 60°, 70° or 80° angle, suitable for cutting the teeth of ratchet wheels, cutters and mills.

Diam.	Thickness	Hole	Carbon Steel	High Speed Steel
Ins.	Ins	Ins	Rs A.	Rs. A.
2½	½	⅞	14 8	19 0
2¾	½	1	15 8	21 8
3	½	1¼	18 8	24 8
3	⅝	1¼	25 4	28 0
3½	¾	1¼	28 4	35 0
4	1	1¼ & 1½	38 8	47 0

Concave and Convex Cutters.

For Milling Half Circles.

These Cutters can be sharpened by grinding without changing their form.

Diam. of Circle.	Diam of Cutter. H. S.	Diam. of Cutter. C. S.	Hole	Convex Cutters. Carbon Steel.	Convex Cutters. High Speed Steel.	Concave Cutters. Carbon Steel.	Concave Cutters. High Speed Steel
Ins.	Ins	Ins.	Ins.	Rs A.	Rs. A.	Rs. A.	Rs A.
⅛	2¼	2	⅞ or 1	8 12	22 0	14 0	25 0
3/16	2¼	2	⅞ or 1	10 4	23 0	14 8	26 0
¼	2¼	2	⅞ or 1	13 0	24 0	16 0	28 0
5/16	2½	2¼	1	14 0	27 0	17 0	31 0
⅜	2½	2¼	1	14 8	28 0	17 12	33 0
7/16	2½	2½	1	15 0	30 0	18 12	35 0
½	2½	2½	1	16 0	32 0	20 0	37 0
⅝	2¾	2¾	1	19 8	38 0	25 0	45 0
¾	3	3	1	23 0	42 0	29 0	54 0
⅞	3¼	3¼	1	27 0	46 0	33 4	62 0
1	3½	3½	1	29 0	51 0	34 0	71 0
1⅛	4	3½	1¼	39 0	65 0	45 0	86 0
1¼	4	3¾	1¼	40 4	69 0	47 8	92 0
1⅜	4¼	4	1¼	44 8	77 0	53 8	104 0
1½	4¼	4¼	1¼	46 0	81 0	58 0	111 0

Involute Cutters for Teeth of Gear Wheels.

Can be sharpened by grinding without changing their form.

Range of Cutters. According to the system adopted eight cutters are required for each pitch. These eight cutters are adapted to cut from a pinion of twelve teeth to a rack and are numbered respectively as follows:

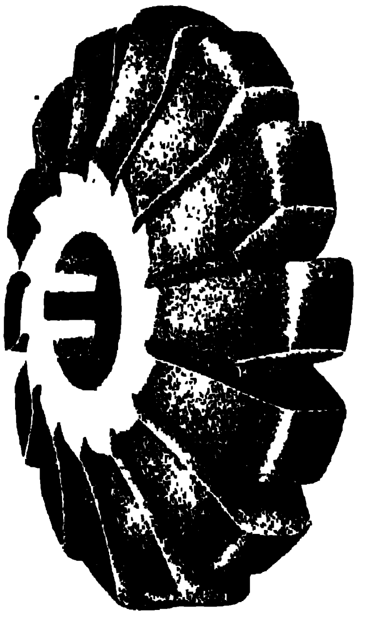
No. 1 will cut wheels from 135 teeth to a rack
" 2 " " " " 55 " " 134 teeth
" 3 " " " " 35 " " 54 "
" 4 " " " " 26 " " 34 "
" 5 " " " " 21 " " 25 "
" 6 " " " " 17 " " 20 "
" 7 " " " " 14 " " 16 "
" 8 " " " " 12 " " 13 "

Half Numbers. When a finer division of teeth is required we can furnish cutters made to half numbers. Gears cut with these cutters will interchange with gears cut with the regular No. 1 to No. 8 cutters.

The half numbers are as follows:

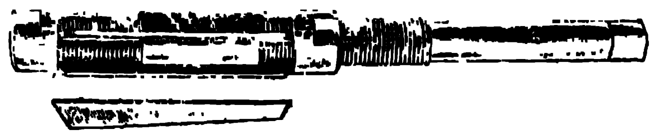
No. of cutter	Range	No. of cutter	Range	No. of cutter	Range
1½	80 to 134 teeth	4½	23 to 25 teeth	6½	15 to 16 teeth.
2½	42 " 54 "	5½	19 " 20 "	7½	13
3½	30 " 34 "				

In ordering, give the No. of cutter, diametral pitch, diameter of cutter, and size of hole required.



Diametral Pitch.	Diam. of cutter		Size of hole.		Price, each cutter.		
	Carbon Steel.	H. S. Steel	Carbon Steel	H. S. Steel	Carbon Steel		H. S. Steel
	Ins.	Ins.	In.	In.	Rs.	A.	Rs.
3	4[illegible]	4[illegible]	1[illegible]	1[illegible]	42	0	80
3½		4[illegible]		1[illegible]			69
4	3[illegible]	4[illegible]	1[illegible]	1[illegible]	31	8	58
4½		4		1[illegible]			50
5	3[illegible]	3[illegible]	1[illegible]	1[illegible]	26	8	46
5½		3[illegible]		1[illegible]			41
6	3	3[illegible]	1	1[illegible]	22	12	38
7	[illegible]	2[illegible]	1	1	21	8	32
8	2[illegible]	2[illegible]	1	1	20	12	30
9	2[illegible]	2[illegible]	1	1	19	8	24
10	2[illegible]	2[illegible]	[illegible]	1	18	8	26
11	2[illegible]	2[illegible]	[illegible]	1	17	8	25
12	2[illegible]	[illegible]	[illegible]	1	16	4	25
14	2	2½	[illegible]	1	14	4	23
16	2	2½	[illegible]	1	13	8	22
18	1[illegible]	2[illegible]	[illegible]	1	12	8	22
20	1[illegible]	2[illegible]	[illegible]	1	12	0	21
22	1[illegible]	2[illegible]	[illegible]	1	11	8	21
24	1[illegible]	2[illegible]	[illegible]	1	11	0	21
26	1[illegible]	2[illegible]	[illegible]	1	10	8	21
28	1[illegible]	2[illegible]	⅞	1	9	8	21
30	1[illegible]	2[illegible]	⅞	1	9	8	21
32	1[illegible]	2[illegible]	⅞	1	9	8	21
36	1[illegible]	2[illegible]	⅞	1	9	8	21
40	1[illegible]	2[illegible]	⅞	1	9	8	21
48	1¼	2[illegible]	⅞	1	9	8	21

"Critchley" Expanding Reamers.



The body has five grooves fitted with cutters; a screw thread is cut on the body of the tool, and a portion of it is left in the centre to prevent springing. The cutters are bevelled at each end and confined in their places by nuts, so that it is only necessary to slacken them off and slide the cutters up or down in the tapered grooves to expand or contract their outside diameters, and thus adapt them to the sizes required.

No.	Begin at Diam.	Expands to Diam.	Length of Cutter	Price.	Extra Cutters per set.
	ins.	ins.	ins.	Rs. A.	Rs. A.
00	[illegible]	[illegible]	1¼	15 0	5 0
00½	[illegible]	[illegible]	1¾	15 0	5 0
00¾	[illegible]	[illegible]	[illegible]	15 0	5 0
0	[illegible]	[illegible]	[illegible]	16 0	5 0
0½	[illegible]	[illegible]	[illegible]	16 0	5 0
1	[illegible]	[illegible]	2⅜	17 0	5 0
1½	[illegible]	[illegible]	2⅝	17 0	6 0
2	[illegible]	[illegible]	2¾	18 8	6 0
3	[illegible]	1	3	19 8	6 0
4	1⅛	[illegible]	3¼	22 0	6 12
5	[illegible]	[illegible]	3½	25 0	7 8
6	[illegible]	[illegible]	4	30 0	8 8
7	[illegible]	[illegible]	4¼	33 0	12 0
8	[illegible]	[illegible]	[illegible]	39 0	14 0

Sets in Wooden Boxes.

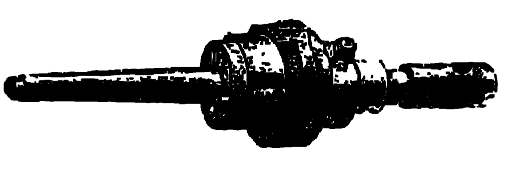
Set of 7 Reamers Nos. 00 to 1½	.. Price, Rs. 110
„ „ 10 „ „ 00 „ 4	.. „ „ 170
„ „ 14 „ „ 00 „ 8	.. „ „ 296

Five Fluted Reamers. Taper or Parallel.

Size ins.	¼	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1	1 1/16
Price, each Rs	2-0	2-4	2-8	2-14	3-4	3-12	4-6	4-1	5-8	6-0	7-8	8-10	11-8

Size ins.	1⅛	1 3/16	1¼	1 5/16	1⅜	1 7/16	1½	1 9/16	1⅝	1 11/16	1¾	2
Price, each Rs	22-0	15-0	16-8	18-0	20-0	21-8	24-0	25-0	26-0	27-0	28-0	32-0

Dudgeon's Improved Patent Roller Tube Expander.



Diam	Price each	Diam	Price each.	Diam.	Price each
ins.	Rs. A.	ins	Rs. A.	ins.	Rs A.
1¼	15 0	2	21 0	3	37 8
1½	15 0	2⅛	24 0	3⅛	42 0
1⅝	16 8	2⅜	25 0	3¼	42 0
1¾	18 8	2½	26 8	..	..
1⅞	18 8	2¾	30 0	..	.

Edgar Allen's AIR-HARDENING High Speed Twist Drills.

Edgar Allen and Company, Limited, who were among the first makers of high speed steels produced, after prolonged experiment, a "Stag Air-Hardening" high speed steel, especially suitable for twist drills, which combined toughness with great keenness of temper. This steel allowed itself to be run almost at a red heat without loss of edge, and when it became cool, could be used again without re-tempering. Thus, it not only ved time and labour, but gave much greater output on account of its higher cutting speed.

In modern engineering practice the use of High Speed Twist Drills has been recognised as essential to rapid and economical production, and being Sole Agents in Eastern India for Edgar Allen's Twist Drills and Tool Steel, we are in a position to offer the products of one of the best British manufacturers.

Speeds and Feeds.

The table of speeds and feeds, as given below, should only be used as a general guide. Judgment and experience are the only safe tests for the correct drilling rates on any particular class of work.

Factors to be taken into account are.—

1. The class of work.
2. The heat-conductivity of the work.
3. The depth of the hole
4. The nature of lubricating medium.
5. The frequency of re-grinding.

In connection with No. 2 it must be pointed out that when there is insufficient metal to carry away quickly the heat generated by drilling, the speed will need to be slower. In other words, drills can be run faster and will do heavier work on large masses of metal than on small pieces, owing to the fact that the large masses enable the heat to radiate from the point of contact fairly rapidly, whereas in the small pieces it remains concentrated at the drilling point

General Cast-iron Work. (It will be well to use a certain amount of judgment as there are various grades of hard and soft iron.)			General Iron and Mild Steel Work.		Very Hard Steel Work.	
Diameter of Drills. Inches.	Revolutions per minute.	Revolutions per inch of feed.	Revolutions per minute.	Revolutions per inch of feed.	Revolutions per minute.	Revolutions per inch of feed.
¼	1,200	165	1,025	150	720	200
5/16	900	160	875	150	625	190
⅜	865	160	750	150	545	190
7/16	750	160	650	150	450	190
½	630	110	550	100	380	145
⅝	520	110	450	100	320	145
¾	430	110	375	100	265	140
⅞	375	110	325	100	220	140
1	320	85	275	75	180	135
1⅛	290	85	250	75	175	105
1¼	260	85	225	75	160	105
1⅜	230	85	200	75	140	100
1½	200	85	175	75	120	100
1¾	175	85	150	75	100	95
2	155	85	135	75	90	95
2¼	140	65	120	60	85	95
2½	125	65	110	60	75	80

Causes of Fracture, Etc.

1. To driving the drill at an ordinary speed and heavy speed, instead of at a quick speed and light feed.
2. To incorrect grinding—angle of lip clearance too great—too small a clearance angle—unequal grinding of the lips—unequal angles on the cutting edges.
3. To not allowing the drill to "centre" truly to its work before the feed is put on.
4. To using a badly damaged socket or a drill with a damaged tang
5. Springing, due to elasticity in the press or work.
6. To insufficient rigidness in supporting the work.
7. To the employment of inexperienced drillers.

TRADE MARK

Edgar Allen's AIR-HARDENING High Speed Twist Drills.

GRANTED 1885.

Morse Taper No. 1.				Morse Taper No. 2.				Morse Taper No. 3.				Morse Taper No. 4.				Morse Taper No. 5			
Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.	Size Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.	Size Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.
1/8	2 5	3/8	2 12	9/16	4 8	13/16	6 12	15/16	8 13	1 3/16	14 10	1 9/32	19 14	1 17/32	30 0	1 25/32	40 8	2 1/8	62 0
5/32	2 5	13/32	2 15	19/32	4 11	27/32	7 2	31/32	9 6	1 7/32	15 12	1 5/16	20 10	1 9/16	31 8	1 13/16	42 0	2 1/4	70 0
3/16	2 7	7/16	3 2	5/8	4 14	7/8	7 11	1	9 15	1 1/4	16 8	1 11/32	21 12	1 19/32	33 0	1 27/32	43 8	2 3/8	80 0
7/32	2 7	15/32	3 6	21/32	5 1	29/32	8 4	1 1/32	10 14	..	..	1 3/8	23 4	1 5/8	34 8	1 7/8	45 0	2 1/2	90 0
1/4	2 8	1/2	3 9	11/16	5 4	..	..	1 1/16	11 10	..	..	1 13/32	24 0	1 21/32	35 10	1 29/32	47 0	2 5/8	104 0
9/32	2 10	17/32	3 12	23/32	5 10	..	..	1 3/32	12 6	..	..	1 7/16	25 8	1 11/16	36 12	1 15/16	49 0	2 3/4	118 0
5/16	2 10	..	..	3/4	6 0	..	..	1 1/8	13 2	..	..	1 15/32	27 0	1 23/32	37 14	1 31/32	51 0	2 7/8	134 0
11/32	2 12	..	..	25/32	6 6	..	..	1 5/32	13 14	—	..	1 1/2	28 8	1 3/4	39 0	2	53 0	3	150 0

£.s.d. Carbon Steel.

Morse Taper No. 1.				Morse Taper No. 2.				Morse Taper No. 3.				Morse Taper No. 4.				Morse Taper No. 5.			
Size. Ins	Each Rs. A.	Size. Ins.	Each Rs. A.	Size Ins.	Each Rs. A.	Size. Ins	Each Rs. A.	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.	Size. Ins.	Each Rs. A.
1/8	0 13	3/8	1 7	9/16	2 4	13/16	3 7	15/16	4 11	1 3/16	7 14	1 9/32	9 0	1 17/32	14 2	1 25/32	20 12	2 1/8	34 0
5/32	0 13	13/32	1 9	19/32	2 6	27/32	3 12	31/32	5 2	1 7/32	8 4	1 5/16	9 6	1 9/16	14 14	1 13/16	21 14	2 1/4	39 0
3/16	0 14	7/16	1 12	5/8	2 8	7/8	4 1	1	5 8	1 1/4	8 10	1 11/32	9 14	1 19/32	15 10	1 27/32	23 2	2 3/8	44 0
7/32	1 0	15/32	1 15	21/32	2 11	29/32	4 6	1 1/32	5 14	..	..	1 3/8	10 4	1 5/8	16 8	1 7/8	24 4	2 1/2	49 0
1/4	1 1	1/2	2 2	11/16	2 13	..	..	1 1/16	6 4	..	..	1 13/32	11 0	1 21/32	17 4	1 29/32	25 8	2 5/8	54 0
9/32	1 3	17/32	2 3	23/32	3 0	..	..	1 3/32	6 12	..	..	1 7/16	11 12	1 11/16	18 0	1 15/16	26 12	2 3/4	60 0
5/16	1 4	..	..	3/4	3 2	..	..	1 1/8	7 2	..	..	1 15/32	12 8	1 23/32	18 12	1 31/32	28 0	2 7/8	68 0
11/32	1 5	..	..	25/32	3 5	..	..	1 5/32	7 8	..	..	1 1/2	13 4	1 3/4	19 8	2	29 0	3	75 0

Straight Shank Twist Drills, for Breast Drills, etc.

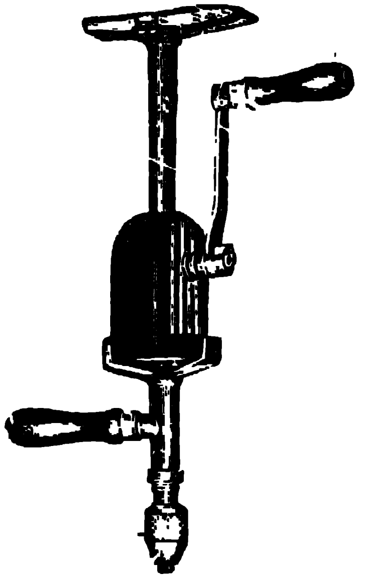
Size .. .. In.	1/16	3/32	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8
Each .. .. Rs.	0 4	0 5	0 6	0 7	0 8	0 12	1 0	1 4	1 14	2 8

Carbon Twist Drills for Ratchet Braces.

Size In.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
Each Rs.	3 0	3 4	3 8	3 10	3 12	3 12	4 0	4 0	4 0	4 8	5 8	6 0	6 12

Patent Breast Drills.

The No. 1 "Excelsior" Breast Drill.



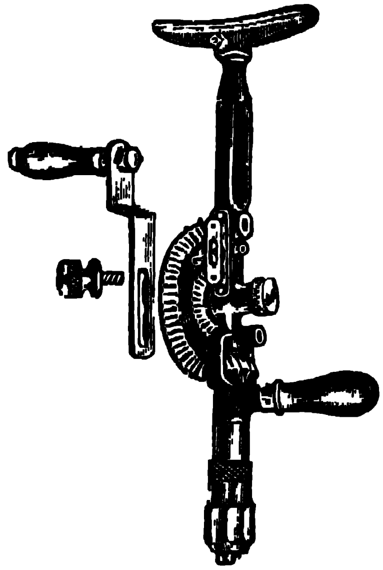
The "Excelsior" Breast Drill has a flywheel to add to its easy and steady running. The Gears are of special quality steel, cut from the solid and will not break. They are run in double bearings, are covered up and are dust-proof, but the cover can easily be removed for inspection.

The 3-Jaw Chuck will hold tightly and allows either Straight or Taper Shank Drills to be used up to $\frac{9}{16}$ in. diameter.

Length, about 19 ins.
Approx. weight, 6½ lbs.

Price, Rs. 42-8

No. 12 Miller's Falls
Patent Breast Drill.

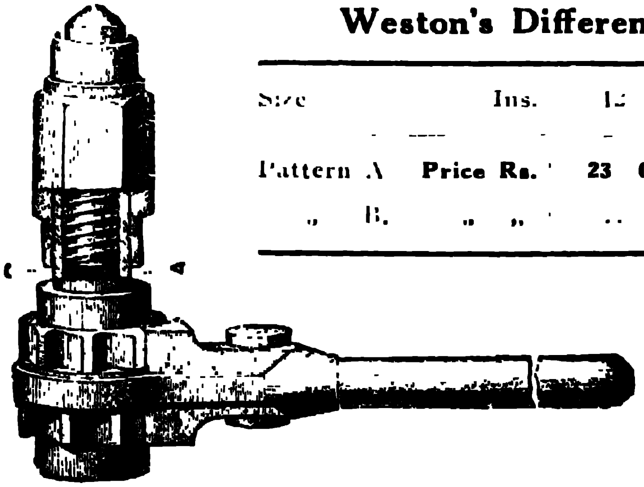


The No. 12 Miller's Falls Patent Breast Drill has two speeds--Even and 3 to 1. The Gears are cut from the solid and is fitted with an adjustable crank and spirit level attachment.

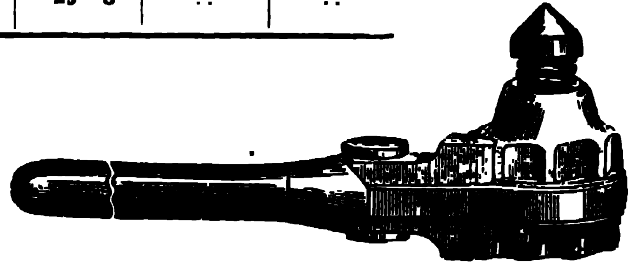
The Chuck holds either Round or Square Shank Drills up to $\frac{3}{8}$ in. diameter. **Price, Rs. 21-12**

Weston's Differential Ratchet Braces.

Size	Ins.	12	14	16	18
Pattern A	**Price Rs.**	**23 0**	**25 8**	**27 8**	**30 0**
„ B.	„ „	..	**25 8**	..	..

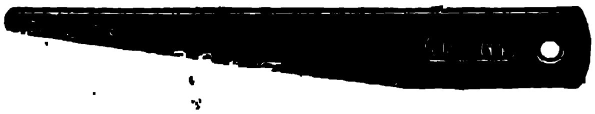


Pattern A.



Pattern B.

Hardened Drill Drifts.
Model 1045.



Costs you less than any other method of releasing drills. Made from tempered drawn spring steel, specially prepared for the purpose. Sandblast finish. A necessity in every modern workshop.

Made in four sizes, Nos.	1			
Price, each .. .. Rs.	**1-6**	**1-10**	**1-14**	**2-0**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co Ltd
ENGINEERS

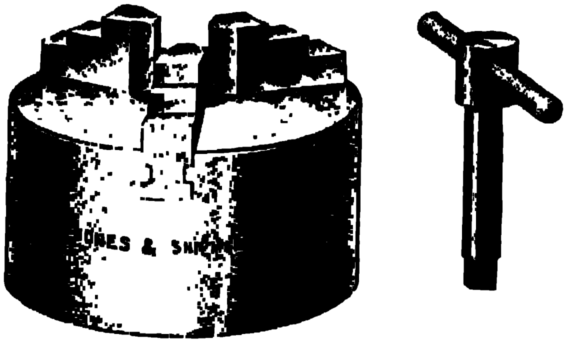
RANGOON, MADRAS, BOMBAY, LONDON.

Machine Shop Appliances.

By Jones and Shipman, Ltd.

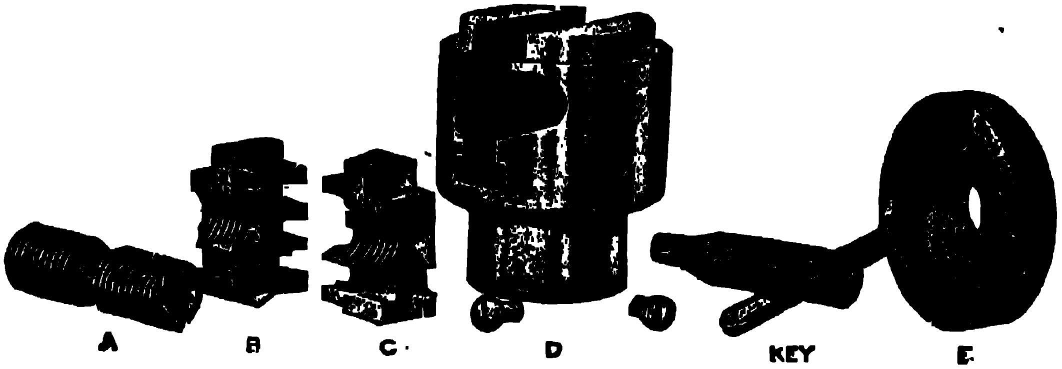
Three-Jaw Self-Centering Chuck.

During the war the makers were unable to obtain satisfactory chuck to meet the requirements of precision grinding, accordingly they commenced to manufacture for their own requirements, and are now able to offer a really satisfactory Geared Scroll Chuck as near to perfection as it is possible to make, most of the faults in former chucks having been eliminated in the design and manufacture of the "J. & S."



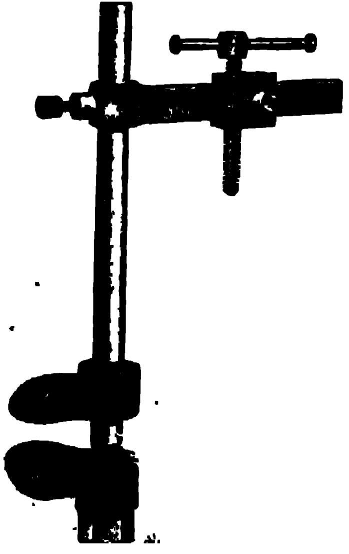
No. 1050.	Will hold up to	Centre Hole.	Approx. Weight.	Price complete with 2 sets solid Reversible Jaws.
3 ft.	3¼ ins.	⅝ in.	6 lbs.	Rs. 72 each.
4 „	4⅜ „	1	8 „	„ 84 „

All-Steel 2-Jaw Drill Chuck.



Made of Steel throughout it is more suitable for Sensitive Drill Presses than any chuck of similar type at present on the market.

Interchangeability.—We have sold Drill Chucks for many years, and understand all the difficulties with which every chuck user is acquainted when repair parts are required. Every component of this "J. & S." Chuck is interchangeable, being manufactured to correct limits on the most modern quantity production methods.



Accuracy—The system of inspection after every operation in the process of manufacture ensures a guarantee that this "J. & S." Model 1052 is the most accurate ½-inch Two-Jaw Drill Chuck on the market.

Model	Holds Drills up to	Outside diameter	Weight	Complete
1052	½-inch.	2 1/16-inch.	2lbs.	with Key.

Price, Rs. 35-0

Drilling Pillars.

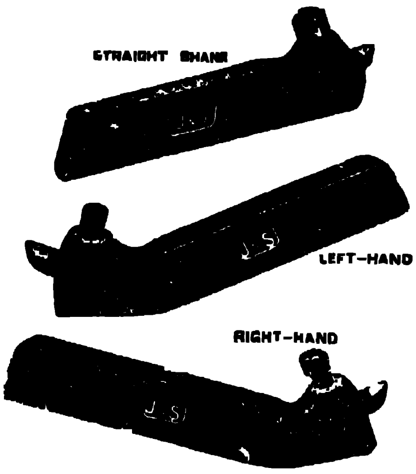
All Steel Drilling Pillars, Admiralty Pattern,
Size, 21 ins. by 1½ ins., **Price, Rs. 40-0.**

All Steel Drilling Pillars with sliding arms,
Size, 31 ins. by 1⅝ ins. **Price, Rs. 55-0.**

Machine Shop Appliances.

Turning Tool Holders.

For English Lathes. Model 1041.



For use on lathes with low centres. Drop-forged from selected steel, machined on top and bottom, true with the sides, and case hardened by our special process, giving a fine blue and grey mottled finish. The cutters, of first quality high speed steel, are hardened and ground to shape. Complete with wrench and one high speed cutter.

Size No	Size of Holder. Straight, Right or Left Hand.	Size of Cutters, Square.	Height Base to Point.	Price either Straight, Right or Left Hand. Rs.	A.	P.
11*	¼"×⅝"×6"	1/16"	9/16"	10	4	0
12†	⅜"×1"×7½"	¼"	11/16"	12	4	0
13	½"×¾"×8½"	5/16"	13/16"	15	8	0
14	⅝"×1"×9½"	⅜"	15/16"	19	8	0
15	1"×1¼"×10½"	7/16"	1 1/16"	24	12	0
16	1¼"×1½"×11½"	½"	1 3/16"	31	0	0
17	1⅜"×1¾"×13½"	⅝"	1 5/16"	46	0	0
18	1⅝"×1⅞"×15½"	¾"	1½"	73	12	0

*If Right-Hand Holders are required add 11R † If Left-Hand Holders are required add L as 12L.

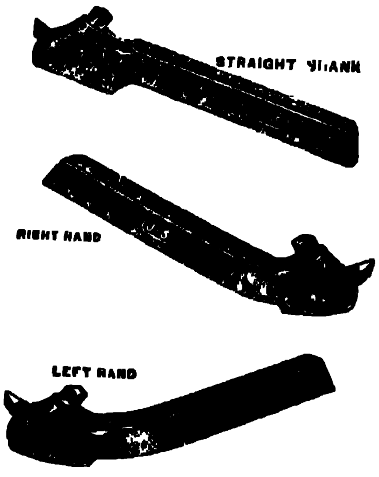
Turning Tool Holders.

For American Lathes. Model 1001.

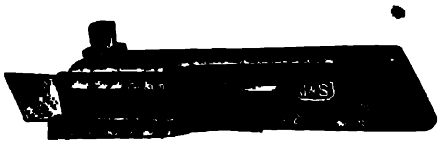
"J. & S" Holders are drop forged steel, case hardened Machined on top and bottom, true with the sides. The cutters are made from a first quality high speed steel, hardened and points ground to shape.

All sizes can be supplied either straight, right or left hand.

Complete with wrench and one high speed cutter. If Left-hand Holders are required add L as 8L. If Right-hand Holders are required add R as 6R.



Size No.	Size of Holder, Straight, Right or Left Hand.	Size of Cutters, Square	Price, either Straight, Right or Left Hand Rs.	A.	P.
	5/16"×⅝"×4"		9	12	0
2	⅜"×⅞"×5"	¼"	10	4	0
3	½"×1⅛"×6"	5/16"	11	12	0
4	⅝"×1⅜"×7"	⅜"	14	8	0
5	¾"×1⅝"×8"	7/16"	19	4	0
6	⅞"×1⅞"×9"	½"	24	12	0
7	1"×2"×11"	⅝"	31	8	0
8	1¼"×2¼"×13"	¾"	47	0	0



Model 1011

Straight Shank Model.

Made also in Right Hand and Left Hand Models.

The blade of this side tool is of different section to the cutting-off tools. It is designed for facing square up to a shoulder. The blade leans away from the top to give a constant clearance.

Can be held and used in almost every type of tool post.

Complete with wrench and one high speed cutter.

Thread Cutting Tool Holder.

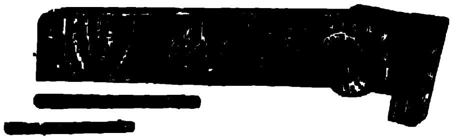
Size No.	Size of Holder. Straight, Left or Right Hand.	Size of Cutter	Price Rs.	A.	P.
41*	5/16"×¾"	½"×⅛"	10	4	0
42†	⅜"×⅞"	⅝"×5/32"	12	4	0
43	½"×1⅛"	¾"×3/16"	15	8	0
44	⅝"×1⅜"	⅞"×3/16"	21	4	0
45	¾"×1⅝"	1"×¼"	27	8	0

***If Right-hand Holders are required add R. as 41R.**
†If Left-hand Holders are required add L. as 42L.

Machine Shop Appliances.

Thread-Cutting Tool Holder.

Model 1040.



Whitworth Standard
3½ up to 40 Threads per inch .. 20 sizes

The special advantage of this Tool is seen in the perfect accuracy with which it forms the Crests and Roots as well as the fundamental angles of all standard threads. The core and full diameters of the screw are gauged to a nicety by means of the radii or lips in the cutting blade.

The blades are of finest steel suitably hardened. When grinding is necessary, the top face only of the blade is touched, leaving the formed edge true throughout the whole length of the blades.

This holder can be used in both English and American types of tool post. The cutting blade is adjustable for height, with the required exactitude for screw-cutting.

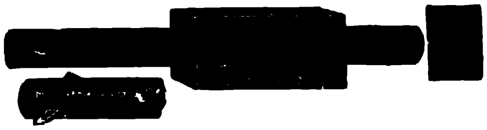
Cutters have 15° clearance from the perpendicular.

Model No. 1040.	Size of Holder.	Weight.	Price of Holder with one Cutter.	Extra Cutters.
Size No. 51	¾ × ⅜ × 5¼	10½ oz.	Rs. 22 8	Rs. 6 8 each.
„ 52	1 × ½ × 6	19 oz.	„ 22 8	6 8 „
„ 53	1¼ × ⅝ × 8½	2 lb. 14 oz.	„ 40 0	6 8 „

Boring Bar and Holder.

For English Lathes.

Model 1020.



Made entirely of steel finished in a first-class manner, and all wearing parts hardened. Model 1020 above is made to fit in the slide rest of English pattern lathes, and Model 1021 suitable for the tool post of American type lathes. Both bars can be extended through their holders to any desired length according to depth of hole required.

Size No.	Size of Block.	Size of Bar Dia. Length.	Size of Cutter, Square.	Height from Point of Tool to Rest.	Price complete with two Cutters.
66	¾" × 3"	9/16" × 8"	3/16"	½"	Rs. 14 0
67	1" × 4"	¾" × 10½"	¼"	⅝"	„ 16 8
68	1¼" × 4½"	15/16" × .3"	5/16"	¾"	„ 22 4
69	1½" × 5½"	1⅛" × 15¾"	⅜"	1"	„ 31 12
70	1¾" × 6½"	1 5/16" × 18"	7/16"	1 3/16"	„ 44 0
71	2" × 8"	1½" × 21"	½"	1 5/16"	„ 58 0

Boring Tool Holder.

For American Lathes.

Size No.	Size of Block.	Size of Bar Dia. Length.	Size of Cutter, Square.	Height from Point of Tool to Rest.	Price complete with two Cutters.
60	⅜" × ¾" × 4½"	9/16" × 8"	3/16"	13/16"	Rs. 16 8
61	½" × 1" × 5"	¾" × 10½"	¼"	1⅛"	„ 19 8
62	⅝" × 1¼" × 6"	15/16" × 13"	5/16"	1¼"	„ 26 0
63	¾" × 1½" × 7½"	1⅛" × 15¾"	⅜"	1 7/16"	„ 37 0
64	⅞" × 1⅝" × 9"	1 5/16" × 18"	7/16"	1⅝"	„ 54 8
65	1" × 1¾" × 10½"	1½" × 21"	½"	1⅞"	„ 76 0

Price includes Holder and Bar with two End Caps (straight and 45°) two H. S. Cutters and Wrench.

Model 1021.

"J. and S." Boring Bars are as rigid and take as heavy a cut as any forged tool of the same size. Either takes the place of about a dozen forged tools, so that the economy resulting from their use is evident.

Machine Shop Appliances.

Improved Cutting-off and Screw Cutting Tools.

The design of "J. & S." Cutting-off Tools is unequalled for strength, simplicity, and convenience in use. The blade is made of high speed steel. This cuts much faster than self-hardening steel and can be ground to a much keener edge—a point of great importance both in cutting-off and screw cutting.

The blades are sent out ready for use, one end being ground for cutting-off and the other for screw cutting.

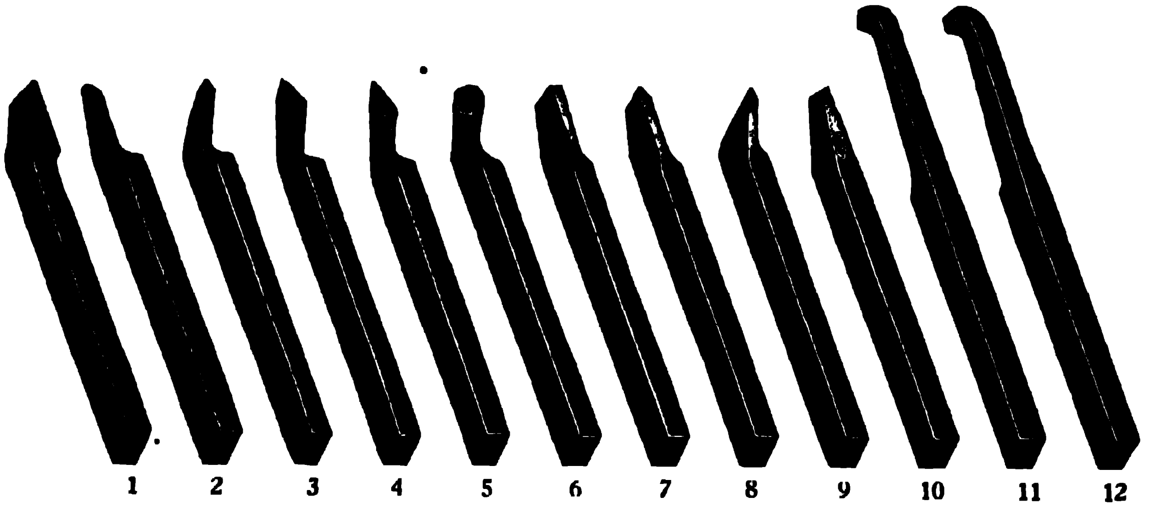
The blade is rolled bevel to correct shape to give proper clearance. This it always retains and can be used until almost worn away.

Straight Tool.	Left Hand Tool.	Right Hand Tool.	Sizes of Holder.	Size of Blade.	Price, complete with Blade.
Size No.	Size No.	Size No.	Inches.	Inches.	Rs. A.
31	31 L	31 R	5/16 × 3/4	½ × 3/32	10 4
32	32 L	32 R	⅜ × 1⅞	⅝ × ⅛	10 12
33	33 L	33 R	½ × 1⅛	¾ × ⅛	13 0
34	34 L	34 R	⅝ × 1⅜	⅞ × 3/16	16 0
35	35 L	35 R	¾ × 1⅝	1 × 3/16	21 8

Forged Steel Lathe Tools.

An equipment of Lathe Tools is necessary for a lathe. Owing to long experience, we are in a position to furnish lathe tools, made of a good quality carbon tool steel, carefully forged, hardened, tempered and ground, ready for use. All are made in suitable sizes to fit South Bend Lathes.

This set of twelve lathe tools is selected as the most suitable for all-around lathe work.



1. Left-hand Side Tool
2. Right-hand Side Tool
3. Right-hand Bent Tool
4. Right-hand Diamond Point
5. Left-hand Diamond Point
6. Round Nose Tool
7. Cutting-off Tool
8. Threading Tool
9. Bent Threading Tool
10. Roughing Tool
11. Boring Tool
12. Inside Threading Tool

Price, per set, Rs. 75-0.

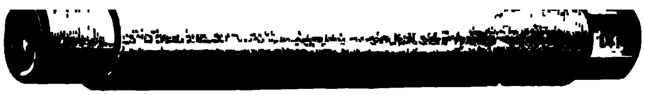
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Machine Shop Appliances.

High Grade Hardened Steel Mandrels.



Model 1044.

Made of Special Tough Steel. The **Centres** are all standardized and made in proportion to the size of the Mandrel. The outer edge of the centre is radiused to prevent burring, and recessed below the end so that force may be applied without injury to the centre *See illustration.*

Accurately ground on hardened steel centres, ensuring absolute truth. Lathe mandrels tapered .0005 per inch. Mandrels ¼ in. to 1 in.—.0005 in. to .0010 in. below size at small end Mandrels 1 1/16 ins. to 2 ins.—.001 in. to .0015 in. below size at small end. Mandrels 2 1/16 ins. to 3 ins.—.0015 in. to .0020 in. below size at small end. Mandrels 3 1/16 ins. to 4 ins.—.0020 in to .0025 in below size at small end.

The Mandrels are the same length on the ground part, as the overall length given by other makers.

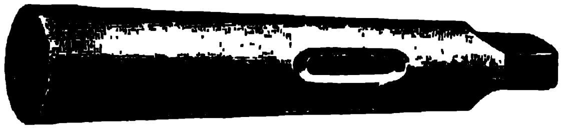
Prices and Dimensions.

Diameter.	Length of Ground part.	Overall Length.	Price, each.		Diameter.	Length of Ground part	Overall Length.	Price, each.		Diameter.	Length of Ground part.	Overall Length.	Price, each.		Diameter.	Length of Ground part.	Overall Length.	Price, each.	
			Rs.	A.				Rs.	A.				Rs.	A.				Rs.	A.
¼″	3″	4″	3	6	1⅛″	7½″	9½″	10	8	1 15/16″	10¾″	13¾″	25	12	2¾″	13″	16″	58	0
5/16″	3½″	4½″	3	14	1 3/16″	7¾″	9¾″	11	2	2″	11″	14″	27	12	2 13/16″	13″	16″	62	4
⅜″	4″	5″	4	6	1¼″	8″	10″	12	0	2 1/16″	11½″	14½″	29	14	2⅞″	13½″	16½″	64	6
7/16″	4½″	5½″	4	12	1 5/16″	8¼″	10¾″	12	14	2⅛″	11½″	14½″	32	2	2 15/16″	13½″	16½″	67	0
½″	4¾″	5¾″	5	2	1⅜″	8½″	11″	14	0	2 3/16″	12″	15″	34	4	3″	14″	18″	70	12
9/16″	5″	6¼″	5	8	1 7/16″	8¾″	11¼″	15	0	2¼″	12″	15″	36	0	3⅛″	14½″	18½″	77	4
⅝″	5¼″	6½″	6	0	1½″	9″	11½″	16	0	2 5/16″	12″	15″	38	10	3¼″	15″	19″	83	12
11/16″	5¾″	7″	6	8	1 9/16″	9¼″	11¾″	17	2	2⅜″	12½″	15½″	40	12	3⅜″	15″	19″	90	0
¾″	6″	7¼″	6	14	1⅝″	9½″	12″	18	4	2 7/16″	12½″	15½″	43	0	3½″	15½″	19½″	99	0
13/16″	6¼″	7¾″	7	4	1 11/16″	9¾″	12¼″	19	6	2½″	12½″	15½″	45	0	3⅝″	16″	20″	107	0
⅞″	6½″	8″	8	0	1¾″	10″	12½″	20	10	2 9/16″	12½″	15½″	48	8	3¾″	16½″	20½″	116	0
15/16″	6¾″	8¼″	8	8	1 13/16″	10¼″	12¾″	21	12	2⅝″	13″	16″	51	8	3⅞″	17″	21″	125	0
1″	7″	8½″	9	4	1⅞″	10½″	13″	23	11	2 11/16	13″	16″	54	8	4″	17½″	21½″	133	0
1 1/16″	7¼″	9¼″	9	14															

N.B.—Mandrels of greater lengths can be supplied at proportionate rates.

High Grade Steel Sleeves. Standard Morse Tapers.

Model 100 B.



Model 100 B.

Ground Externally, Ensuring Absolute Accuracy.

To obtain best results in drilling it is absolutely essential that the Taper Sockets or Sleeves should conform to the Standard Tapers, both as regards length and thickness of tang, width of slot, etc., but from past experience we have found it a difficult matter to purchase sockets which will satisfactorily pass a test on these points. The **High Grade Sleeve** we stock is now well known as the best value sleeve at present on the market. Every sleeve is subjected to a rigid inspection before leaving the manufacturer's works, and is gauged on **Genuine Morse Taper Plugs.** Being ground to size the external accuracy is guaranteed.

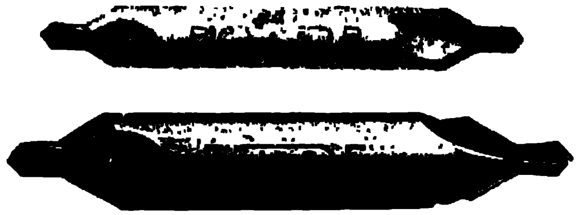
Size No.	Morse Taper Inside.	Morse Taper Outside.	Price, each.	
			Rs.	A.
1 B ⅛ to 9/16	No. 1	No. 2	3	0
2 C 37/64 „ 29/32	No. 2	No. 3	4	0
3 D 59/64 „ 1¼	No. 3	No. 4	5	0
4 H 1 17/64 „ 2″	No 4	No. 5	7	8

Can be supplied hardened throughout if preferred.

Important.—Please quote Model No. as well as Size No. when ordering Sleeves or Sockets.

Machine Shop Appliances.

Combined Drills and Countersinks.



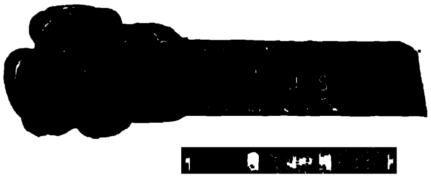
The "J. and S." Combination Centre Drill is definitely a better drill than any previously produced anywhere.

It is made from the finest steel stock. Hardened and tempered by the most approved methods and finished to exactitude by our own special process of backing-off by grinding.

For quality, accuracy and finish no other drill on the market equals the "J. and S." Model 1030. It is as perfect in design as human ingenuity can devise, and in operation gives a **shear out all the time.**

No.	Diameter of Body.	Diameter of Drill Points.	Price, Per Dozen.
A	[illegible]	[illegible]	Rs. 11-0
B	[illegible]	[illegible]	
C	[illegible]	[illegible]	
D	[illegible]	[illegible]	„ 10-4
E	[illegible]	[illegible]	„ 9-4
F	[illegible]	[illegible]	„ 14-0
G	[illegible]	[illegible]	
H	[illegible]	[illegible]	„ 8-4
L	[illegible]	[illegible] - ·082"	„ 9-4
R	[illegible]	[illegible]	„ 14-0

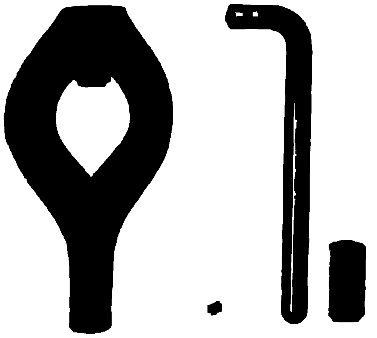
No.	Diameter of Body.	Diameter of Drill Points.	Price, Per Dozen.
1	[illegible]	[illegible]	Rs. 19-0
2	[illegible]	[illegible]	
3	[illegible]	[illegible]	„ 20-8
4	½"	[illegible]	
5	⅝"	[illegible]	„ 29-8
6	[illegible]	[illegible]	
7	[illegible]	[illegible]	„ 31-8
8	[illegible]	[illegible]	
9	[illegible]	[illegible]	„ 38-12
10	¾"	[illegible]	



Knurling Tool.

A perfect Knurling Tool, designed to resist the severe strains of both side and end thrust. The revolving head fitted with fine medium and coarse knurls in pairs gives variety without loss of time, as any pair of knurls can be brought into use by simply turning the head round to the required position. **Price, Rs. 29-0** each.

Drop-Forged (Safety Pattern) Lathe Carriers.



This model gives better balance when on the lathe, and safety to the operator. It is recommended in preference to the old square-head screw type.

The screws are selected steel, practically unbreakable, threaded to Whitworth standard.

Size numbers	70	71	72	73	74	75	76	77	78
Capacity ins.	½	¾	1	1¼	1½	1¾	2	2½	3
Price Rs.	**3-0**	**3-4**	**3-12**	**4-8**	**5-4**	**6-6**	**7-8**	**9-8**	**12-4**

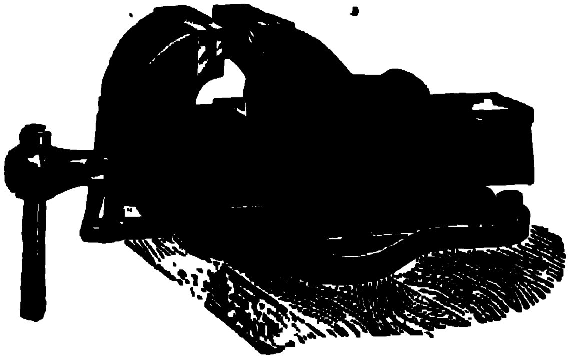
Lathe Dogs.

The Lathe Dogs are heavy malleable iron with

No.	Size	No.	Size
No. 1	Size ¼	No. 7 ..	Size 1¾
„ 2	„ ½	„ 8 ..	„ 2
„ 3	„ ¾	„ 9 ..	„ 2½
„ 4	„ 1	„ 10 ..	„ 3
„ 5	„ 1¼	„ 11 ..	„ 3½
„ 6	„ 1½	„ 12 ..	„ 4

Price, per set of 12, **Rs. 27-0.**

Vices.



Parkinson's Patent "Perfect" Vice.

Cast-Iron Bodies of Guaranteed Strength.

Model F. Fixed Base.

This type of vice has a continuous screw combined with quick action, and is of ample strength for average requirements.

Special methods are employed in the manufacture to ensure the greatest possible strength in the castings, and to maintain uniform quality.

The Steel Jaw plates are well hardened, and are fixed by hexagon head screws from the outside.

Size No.	Width of Jaw.	Depth of Jaw.	Opens.	Weight.	Price.
5	3¼ ins.	2⅜ ins.	4 ins.	30½ lbs.	Rs. 24 0
6	3¾ "	5 "	5 "	44 "	" 28 12
7	4¼ "	3⅜ "	6 "	60 "	" 33 8
8	5¼ "	3¼ "	7 "	74 "	" 41 0
8a	6 "	4⅛ "	8 "	92 "	" 48 0
9	6½ "	4½ "	9 "	112 "	" 55 0
9a	7½ "	5 "	10 "	148 "	" 68 0

Parkinson's Patent "Perfect" Vice.

Cast-Iron Bodies of Guaranteed Strength.

Model F. Swivel Base.

The swivel base vice is an improvement on earlier models: it is more securely clamped, and the clamping lever being at the side of the vice is easily accessible. It is designed so that vices with fixed base may be mounted on the swivel base.

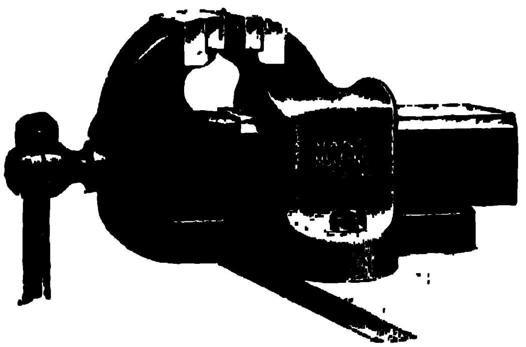
Swivel bases may be ordered separately for vices previously obtained.

Size No.	Width of Jaw.	Depth of Jaw.	Opens.	Weight.	Price.
5	3¼ ins.	2⅜ ins.	4 ins.	41½ lbs.	Rs. 31 0
6	3¾ "	3 "	5 "	60 "	" 37 0
7	4¼ "	3⅜ "	6 "	78 "	" 44 0
8	5¼ "	3¼ "	7 "	97 "	" 53 0
[illegible]	6 "	4⅛ "	8 "	118 "	" 67 0
[illegible]	6½ "	4½ "	9 "	141 "	" 70 0
[illegible]	7½ "	5 "	10 "	183 "	" 87 0

Vices.

Handy " Parallel Vice.

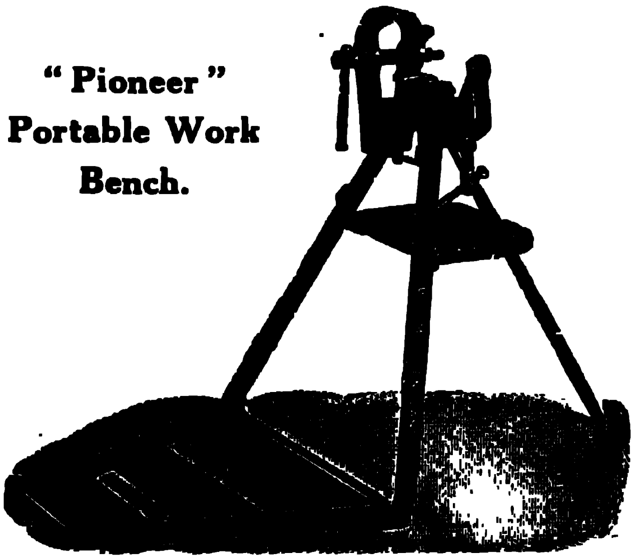
Screw Action only.



This type of vice is constructed with fixed jaws and base formed in one piece in such a way that by the special methods of moulding and casting employed, greater strength is obtained. All the working faces are properly machined and fitted. The steel jaw plates are well-hardened and are renewable.

Size No	Width of Jaw.	Depth of Jaw.	Opens.	Weight.	Price Rs.	A.
0a	2¼ ins.	1½ ins.	2 ins.	5½ lbs.	7	8
1a	2½ "	1⅝ "	2¼ "	7¼ "	8	0
1	3 "	1⅞ "	3 "	12 "	9	8
2	3½ "	2⅛ "	3½ "	19½ "	13	8
3	4 "	2¼ ,	4 "	32 "	18	0
3a	4½ "	2⅞ "	5 "	42 "	21	8
3b	5 "	3⅛ "	6 "	56 "	28	0
3c	6 "	3½ "	8 "	72 "	37	8

" Pioneer " Portable Work Bench.



Bench with Vice and Pipe-gripping arrangement for facilitating threading pipes. Indestructible and indispensable for outdoor work.

The most up-to-date combination for a Portable Work Bench, specially designed to take the place of heavy and cumbersome wooden benches. These benches are made entirely of first class material. The " Pioneer " is collapsible, easily removed from place to place, and absolutely steady when in use.

Weight complete, 74 lbs. Jaws of Vice, 4 inches.

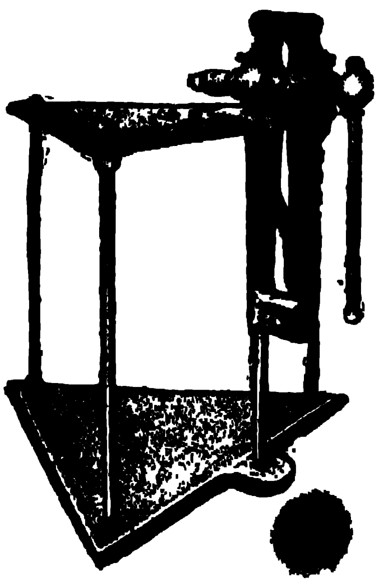
Price of Bench with Vice and Pipe-gripping arrangement.

Pipe Vice for ¼" to 2" Tubes .. Rs. 100-0
Price of Bench with Pipe Vice only " 60-0

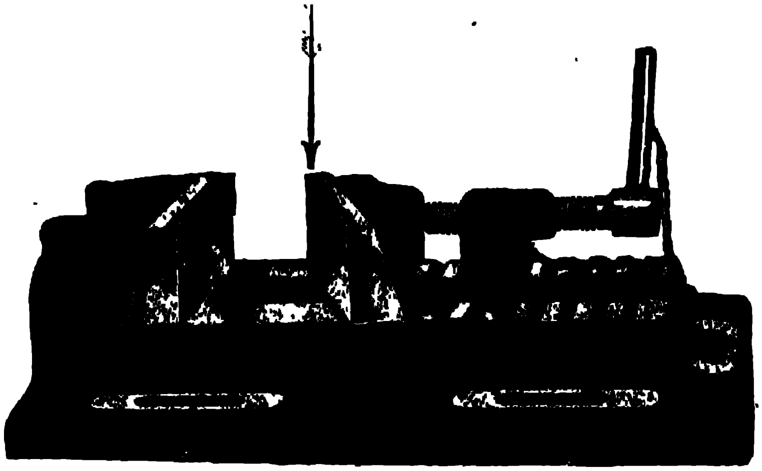
Vice Benches.

Fitted with Staple or Leg Vice.

Size of Vice Jaw ..	.. ins.	4	5	6	8
Weight of Vice about	.. lbs.	50	80	112	230
Price, complete with Vice ..	**Rs.**	**93**	**110**	**135**	**210**



"XL" Machine Vices.



With Retiring Jaws as Illustrated
(see arrow heads above).

This is a popular model of Machine Vice for use on Planing, Shaping, Milling and Drilling Machines.

The material, workmanship and accuracy are guaranteed.

The loose jaw swivels and allows taper or irregular pieces to be securely held.

These vices are made with fixed jaws and retiring jaws. The type, as illustrated, has retiring or pull-down jaws, *i.e.*, the jaw plates at the points of contact with the object to be held, move downwards as the pressure is applied by the clamping screws, and thus the tendency of the loose jaws to lift and throw the work out of level is counteracted by the downward movement of the jaw plates, and the work is kept down on its packing strips or on the machined upper face of the base of the vice.

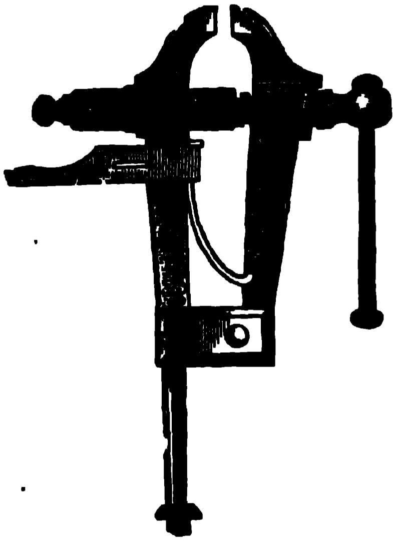
The clamping screw in vices from 6 to 8 inches width of jaws has hexagon head for which a steel box wrench is supplied, an arrangement much superior to using a tommy bar fitting holes drilled in the head of the screw. The gripping screw is turned from the solid steel cut with a square tread and case-hardened. It is of large diameter so as not to bend or break under stress.

Sizes and Prices.

Width of Jaw		3	3	4	4	5	5	6	6	8	8
Depth " "		1¼	1¼	1½	1½	2	2¼	2¼	2¼	2½	2½
Opens ..		4½	7½	5	7½	9½	12½	12½	16	16	20
Length Overall		10½	14	13¾	16¼	19¼	22¼	22½	26	28	32
Width "		7	7	8½	8½	9½	9½	11	11	13	13
No. of slots in base		2	4	2	4	4	4	4	6	6	6
Size " " " " ins.		⅝	⅝	⅝	⅝	⅝	⅝	¾	¾	⅞	⅞
App[illegible] weight in lbs.		20	27	36	41	66	72	96	110	150	170
P[illegible]tiring Jaws	Rs.	60	64	68	74	96	102	115	130	175	192
[illegible]xed "		55	58	62	68	88	94	105	125	165	172

Vices.

Black Staple Leg Vice.

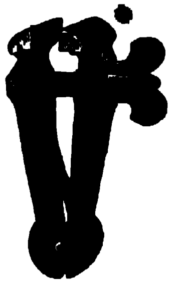


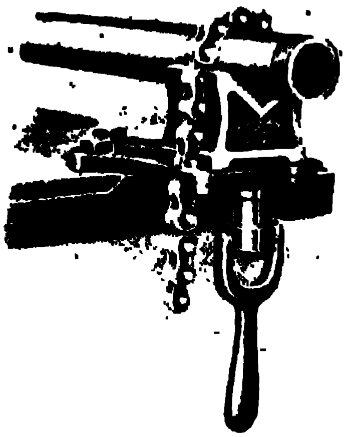
Approx. Weight.	Length of Jaw.	Price, per cwt.
50 lbs.	4 ins.	Rs. 61 0
80 „	5 „	„ 61 0
112 „	6 „	„ 70 0
168 „	8 „	„ 70 0

Hand Vices.

Solid Wrought-Steel.

Length	ins.		
Width of Jaw	ins.	1¼	2
Price, each	**Rs.**	**3 0**	**5 12**





"Vulcan" Chain Pipe Vice.

Constructed of wrought-steel throughout with drop-forged, saw-tempered jaws.

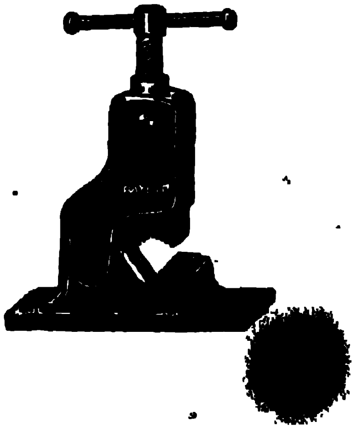
The "Vulcan" Chain Pipe Vice is unbreakable and practically everlasting.

Size No.	For Pipe Sizes.	Price, each.
1	⅛ to 2 ins.	Rs. 17 8
2	¼ „ 4 „	„ 34 8
4	⅜ „ 8 „	„ 90 0

Patent Tube Vice.

With Instantaneous Grip and Continuous Screw.

The instantaneous arrangement on this type of vice consists of a long half nut which is kept engaged with the screw by means of a flat spring. By depressing the stud (see illustration) the nut is instantly released from the screw, thus allowing the jaw to be brought down to the tube or withdrawn, thereby effecting a saving of time; immediately the pressure is taken off the stud, the nut engages again with the screw, and the grip is obtained by a slight turn of the handle.

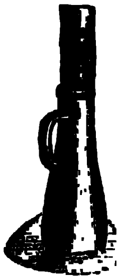


Size	.. No.	1	2	3	4
Will Grip Pipes	.. ins.	¼ to 1¼	¼ to 2	¼ to 3	¼ to 4
Weight	.. lbs.	16	33	46	78
Price, each	.. **Rs.**	**12 8**	**16 0**	**23 8**	**30 0**

Jacks.

The Jacks we supply are of those types which years of experience have proved to be the best and most reliable.

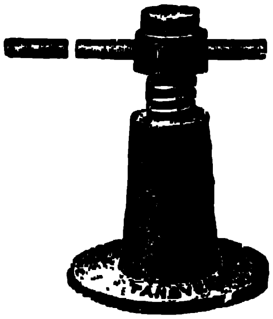
Screw Lifting Jacks.



Body made of Malleable Iron, Screw of Special Steel.

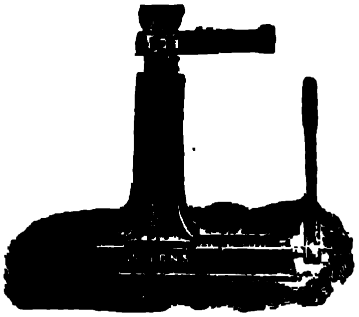
To lift .. .. tons	2	3	6	8	10	12
Diam. of screw .. ins.	1½	1⅝	2⅛	2¼	2⅜	2 7/16
Height when down „	9	12	21	24	27	27
Approx. weight .. lbs	9	12	40	45	56	60
Price each with Malleable Iron Body and Brass Nut .. **Rs.**	**15**	**17**	**34**	**40**	**46**	**55**

Tangye's Transport Jacks. (All-Steel.)



To lift tons	
Diameter of screw .. .. .. ins.	2
Run out .. .. „	5½
Height when down .. .. .. „	9½
Approximate weight .. .. . lbs.	23
Price .. .. **Rs.**	**40**

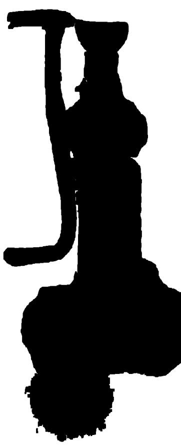
Screw Traversing Jacks.



With Malleable Iron Case and Base and Wrought-Iron Screws.

To lift .. tons	6	8	10	12	15	20	25
Diam. of lifting screw ins.	2⅛	2¼	2⅜	2 7/16	2¾	3	3⅛
Height when down „	20	20	24	24	26	27	27
Length of traverse „	7	7	10	12	15	18	18
Approx. weight .. lbs.	70	76	90	112	137	190	215
Price, each .. **Rs.**	**60**	**66**	**72**	**80**	**95**	**150**	**160**

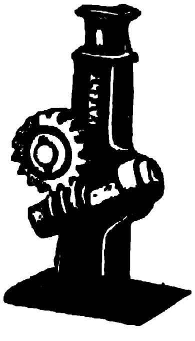
Haley's Screw Lifting Jacks with Iron Body.



To lift .. tons	2	4	6	8	10	12
Diameter of screw ins.	1¾	2	2¼	2½	2¾	3
Height when down „	25	26	28	30	31	34
Approximate weight .. lbs.	59	80	97	132	145	195
Price, each .. Rs.	**72**	**85**	**100**	**120**	**135**	**172**

Tangye's Patent Motor-Car Jacks.

Complete with Handle.

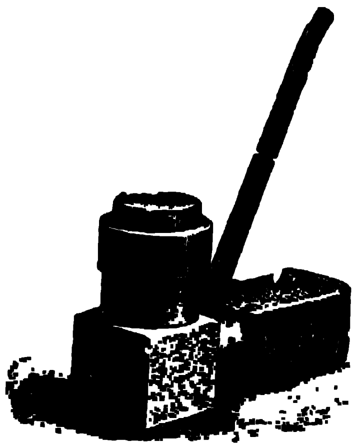


Size No.	Height when down.	Max. run out.	Price, Rs.
	Ins.	Ins.	
1	7¼	4	12 0
o2	8¾	4½	
2	9½	4½	
2a	10¼	4½	
3	11¼	6	16 0
3a	12¾	6	

Hydraulic Jacks.

Tangye's Ship Jacks.

(As supplied to the British Admiralty.)



Each Jack is tested by special machinery to 25% above the weights given in the tables.

The sizes up to and including the 50-ton size have the cylinder of forged steel; in the larger sizes it is of wrought-iron. The smaller sizes have the ram of steel, but in the 50 ton size and upwards it is of cast-iron, with a wrought iron ring shrunk on, and both turned up together.

Pump and plunger are of gun-metal, and lever of wrought-iron.

A pump wrench is supplied with each Jack, and two wrought-iron lifting handles are fitted on sizes over 50 tons.

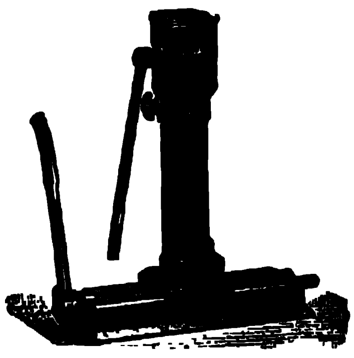
The cistern is so arranged that the Jack can be worked either vertically or horizontally.

To lift	tons	50	100
Height when down	ins	12	13
Run out	,,	6	6
Length overall	,,	19	23
Width	,,	9	16
Approx weight	lbs.	195	387
Price	**Rs.**	**265**	**560**

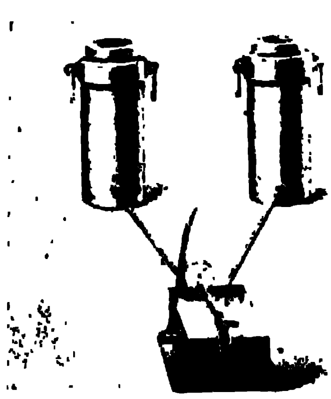
Tangye's Hydraulic Lifting and Traversing Jacks.

Wrought-iron ram and foot in one, cylinder of special hydraulic metal, gun-metal pump and plunger, wrought iron lever, and malleable cast-iron pump wrench. Ratchet traverse lever and wrought-iron traverse screw.

Tested on the head to	tons	10	15	20	30	40	50	60
To lift ,, ,, ,, ,,	,,	8	12	16	24	32	40	48
Height of head when down	ins	30¼	30½	31½	33¼	32½	33[illegible]	34
,, ,, foot ,,	,,	6¼	6¾	7½	9½	9	11¼	11¼
Run out	,,	12	12	12	12	11	10	10
Length of traverse	,,	10	12	12	17½	17½	18	18
,, overall	,,	21	26	28	33	33	38	38
Approximate weight	lbs	130	170	217	306	369	539	622
Price	**Rs.**	**275**	**300**	**355**	**500**	**600**	**880**	**1,100**



Hydraulic Oil Well Jacks.



These Jacks are very extensively used in oil fields, and are applied in pairs for the purpose of extracting bore hole tubes or casings. The tubes are secured by means of clamps, with extending arms under which a Jack is placed on each side of the tube to be withdrawn.

Pressure is then applied from the detached pump which is situated at a convenient distance, and connected to the Jacks by means of copper piping.

When the maximum "run out" of the Jacks has been attained, the ram is lowered, and the clamps re-adjusted for another lift.

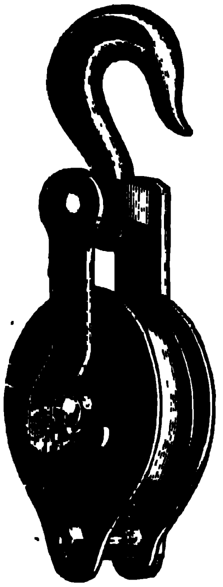
Each Jack comprises, strong hammered iron cylinder, machined inside and outside; ram of cast-iron, turned and polished, with wrought-iron ring shrunk on at the top.

Two Jacks each to lift 15 tons with Pump and 10 feet copper tubing Rs. 1,0[illegible] set.

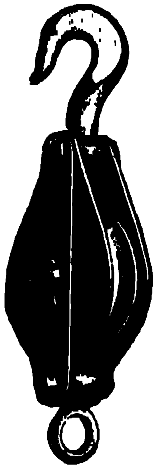
Particulars and Prices for other types on application.

Lifting Tackle.

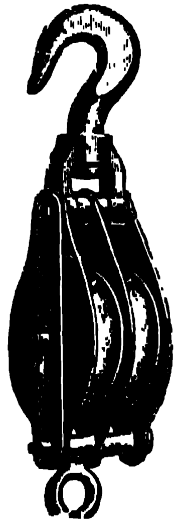
Wrought-Iron Pulley Blocks.



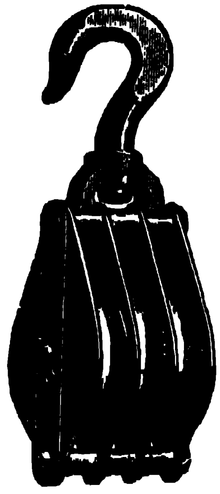
Snatch No. 1.



One-Sheave.



Two Sheave



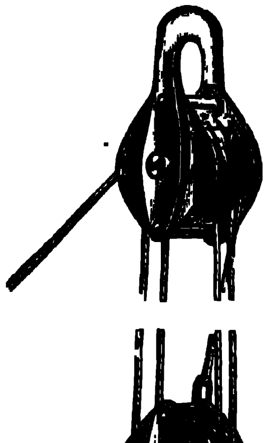
Three-Sheave.

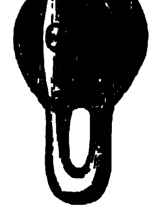
The plates are carefully rounded on the edges to prevent cutting of the ropes. The Sheaves are truly turned and bored, and the centre pins turned to a correct fit

The hooks are made of a quality of Iron specially rolled for the purpose

Diameter of Sheave	ins.	4	6		10	12	14	16
Width of Grove	„	⅝	1			2½	2¾	3¼
Max. load per Sheave	cwts	5	12	27	48	75	90	120
Rope Circumference	ins	1¾	3	4½	6	7½	8¼	9¾
Snatch Block No. 1	Price, Rs	6 4	11 0	18 0	45 0	86 0		
1-Sheave „	„ „	4 8	9 0	14 8	34 8	69 0	92 0	132 0
2-Sheave „	„ „	6 8	13 0	26 0	57 8	120 0	145 0	201 0
3-Sheave „	„ „	8 8	17 0	34 8	80 8	161 0	195 8	276 0

Wire Rope Pulley Blocks.





Dia. of Sheave	ins	8	9	10	12	14	15
To Take Wire Rope Circumference	„	1	1¼	1½	1¾	2	2¼
Snatch Block Approx. Weight each block will lift	cwts	8	12	16	22	30	37
1-Sheave. Approx. „ „ „ „ „	„	8	12	16	22	30	37
2-Sheave. Approx. „ „ „ „ „	.	15	25	33	45	60	75
3-Sheave. Approx. „ „ „ „ „	„	22	37	48	62	90	115
4-Sheave. Approx. „ „ „ „ „	„	30	50	60	90	116	156

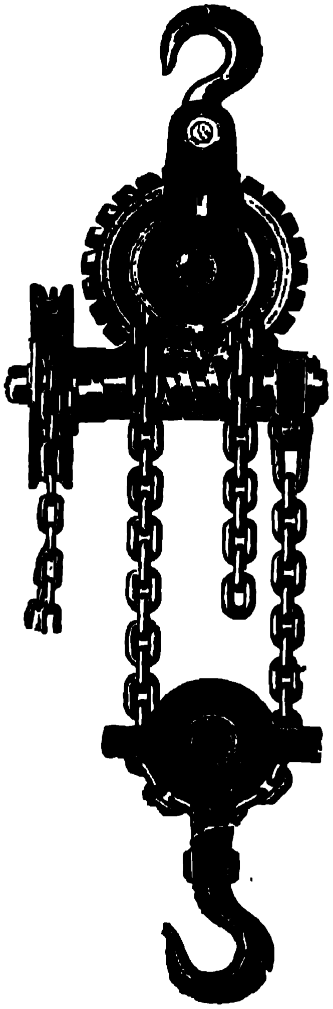
All Blocks from 8 ins. to 14 ins. have hooks; all of 15 ins. and upwards have swivel rings.

Prices on application.

A good margin for safety should always be allowed when ordering. We give the capacities enumerated above for the guidance of purchasers. They are merely approximate and we do not guarantee the weights named to be correct.

Lifting Tackle.

Self-Sustaining, Quick-Lifting, Worm-Geared Pulley Blocks.



These Pulley Blocks are undoubtedly one of the best appliances offered by manufacturers for all round duty.

They are powerful and of exceptional strength and durability. They possess remarkable features of smoothness in working, whether raising or lowering.

The gearing is of the worm and wheel type, the former being of special shape with two threads of coarse pitch, whilst the latter is cast in specially durable iron.

The Block is self-sustaining; there is no back slip, but self-acting dead stop; there are no jerks, and the load can be adjusted to a nicety, better than with any other Pulley Block.

To lift .. .. tons Tested to .. „	½ ¾	1 1½	1½ 2¼	2 3	3 4	4 6	5 7½	6 9	10 15
Price of Blocks, with chain complete for 15 ft. lift .. .. **Rs.**	**130**	**147**	**165**	**200**	**250**	**290**	**350**	**440**	**760**
Approx. weight of Blocks, with chain for 15 ft. lift .. .. lbs.	77	92	125	164	206	286	348	605	848

Weston's Differential Pulley Blocks.

These Blocks are well known and extensively used. They are accurately machined and are of good workmanship throughout.

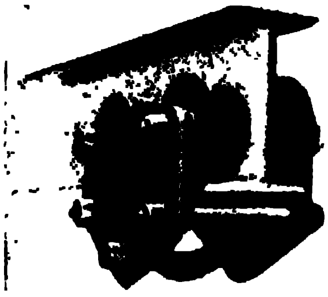
Each Block and Chain is tested to a full test load before leaving the works, but when purchasing care should be taken to select a block of sufficient capacity to allow a fair margin of safety.

The chain is guided evenly into the notches of the sheaves; riding of the chain and jamming of the links being thereby prevented.

Tested to .. tons	¼	½	¾	1	1½	2	3	4	5	6	10
Price of Blocks with chain complete for 15 feet lift .. **Rs.**	**42**	**47**	**52**	**57**	**72**	**85**	**110**	**140**	**220**	**265**	**446**
Approx. weight, with chain complete lbs.	37	48	51	72	106	146	187	270	330	412	607

Overhead Travelling Trolleys.

For use with Pulley Blocks.



With Ungeared
Travelling Wheels.

Any of the Pulley Blocks described on the preceding pages can be hung in these travelling Trolleys thus greatly extending their sphere of usefulness.

With Geared
Travelling Wheels.

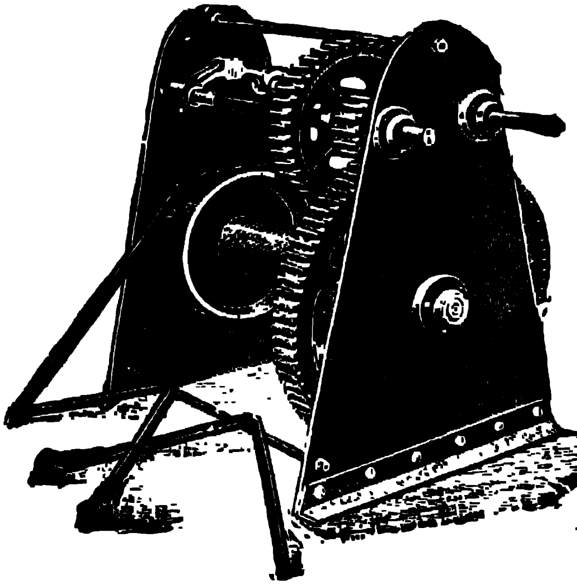
The lifting gear can still be used apart from the trolley. The ungeared trolleys travel by pushing the load. The geared trolleys are racked along by means of the hand-chain. The latter are used for heavy load or when close adjustment of loads is required.

Working Load .. .. tons	1	1½	2	3	4	5	7½	10
Tested to .. .. tons	1½	2¼	3	4½	6	7½	11¼	15
Price with ungeared wheels .. **Rs.**	**115**	**130**	**140**	**155**	**170**	**200**	**250**	**350**
Price with geared wheels, 10 ft. joist to floor .. .. **Rs.**	**180**	**200**	**220**	**250**	**275**	**340**	**390**	**500**

Prices for other types and Electric Lifting Blocks on application.

Crab Winches.

Double Purchase.



With Mild Steel Sides and Ordinary Brake. The Sides are strengthened by having angle iron riveted to their lower edges.

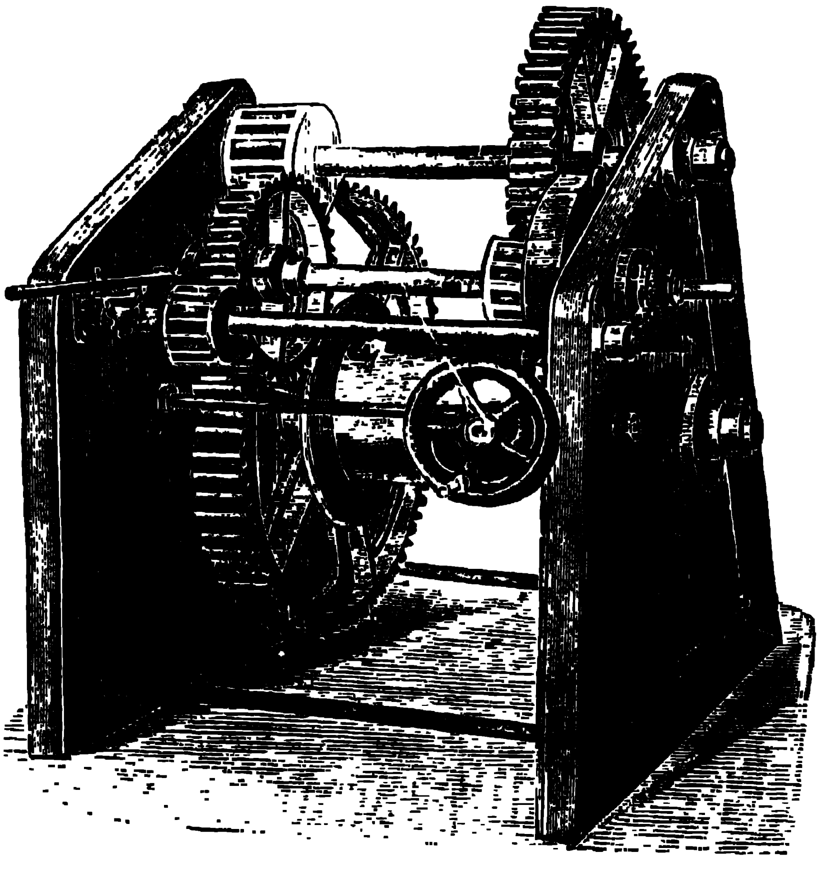
Improved type, being much more convenient to handle than the old pattern.

These Winches are the best in the market for design, material, workmanship, rigidity and safety, and can be worked double gear for heavy loads and single gear for light loads. Gear wheels are of correct proportions, machine moulded and cast in a special mixture of iron; all bearings are correctly bored.

To lift direct from Barrel .. cwt.	16	25	40	48	60
To lift with 2 and 3 Sheave Blocks, tons	4	6	10	12	15
Price each Rs.	**205**	**235**	**280**	**310**	**390**

Treble Purchase.

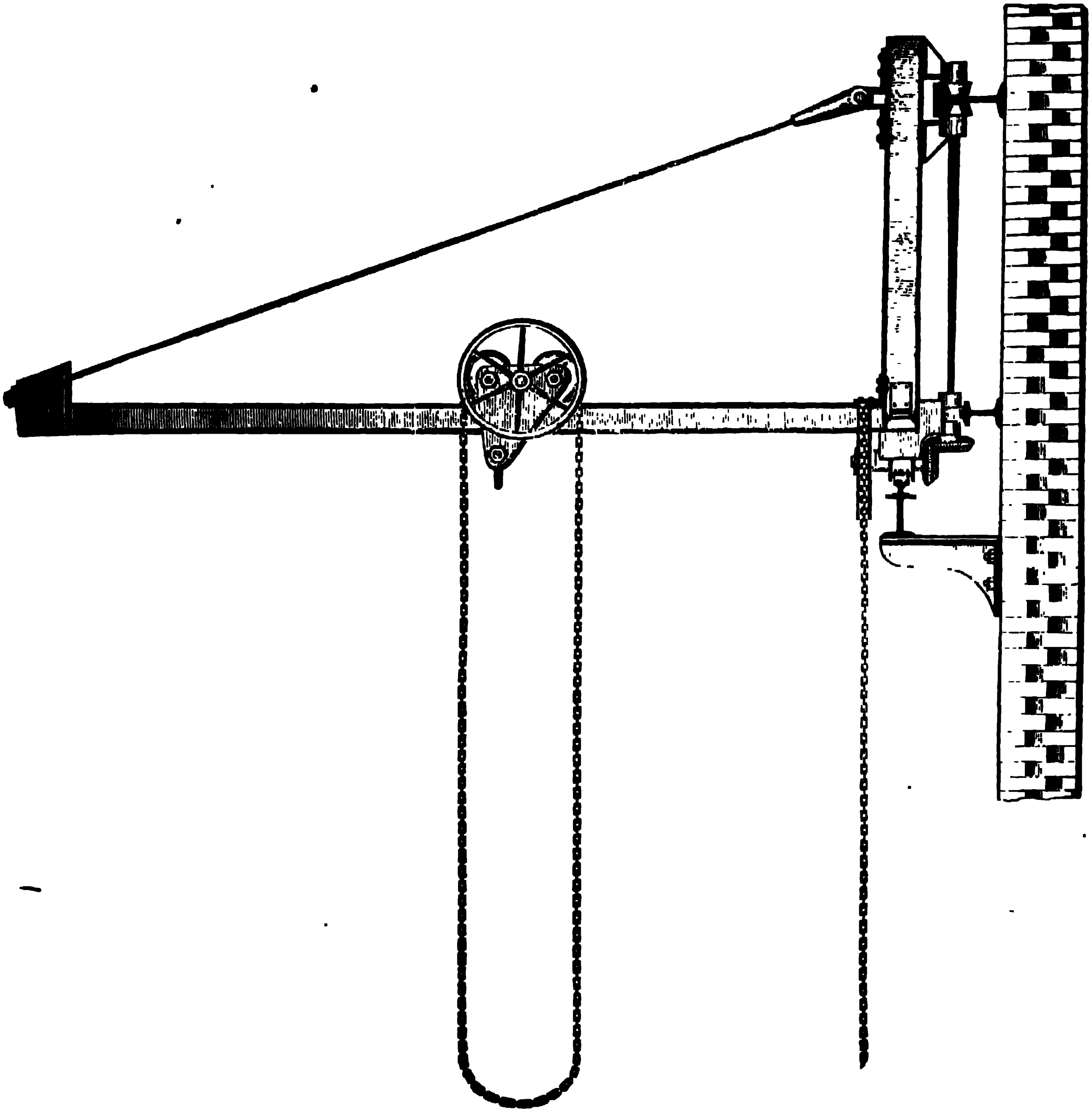
Extra Strong, Improved Design.



With Mild Steel Sides, strengthened with Angle Iron along the bottom for smaller sizes, and all round the sides, for the larger sizes. Gear wheels are well and carefully moulded and are truly bored to fit the respective shafts. Powerful Screw Brake is fitted to each of these Winches. The Bearings are all brass bushed. The Shafts are also turned where they run in the Bearings.

To lift direct from Barrel .. tons	6	10
Diameter of Barrel .. ins.	8	9
Length of Barrel between Flanges ins.	36	42
Approx. Weight cwt.	23	30
Price each Rs.	**780**	**1,035**

Rolled Steel Girder Overhead Wall Traveller.

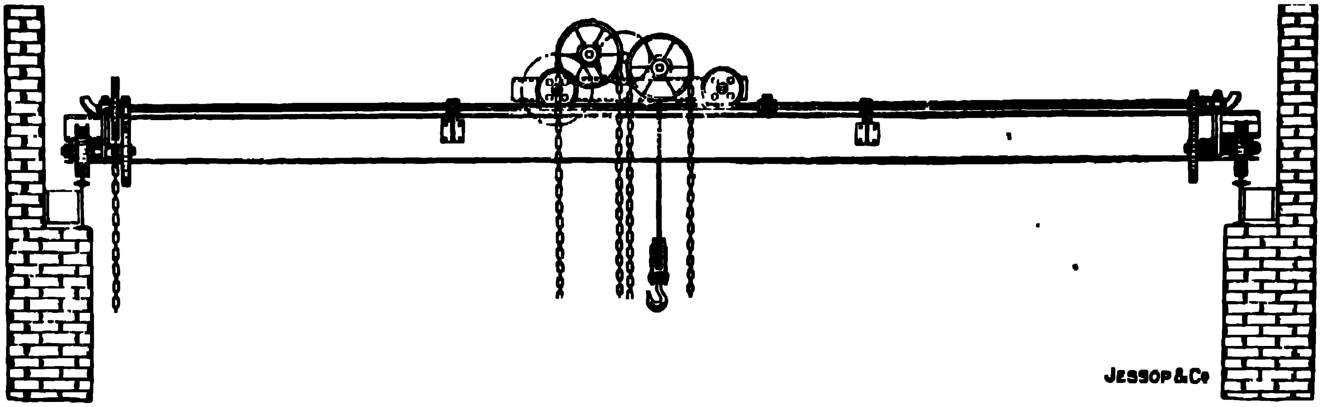


This Crane has been specially designed for travelling along the wall of a building. It is constructed of Rolled Steel Joists and is fitted with chain gears for lifting and lowering the load and travelling in two directions.

Particulars and Prices on application.

Particulars and Prices of Foundry Wall Crane, with self-sustaining Crab, on application.

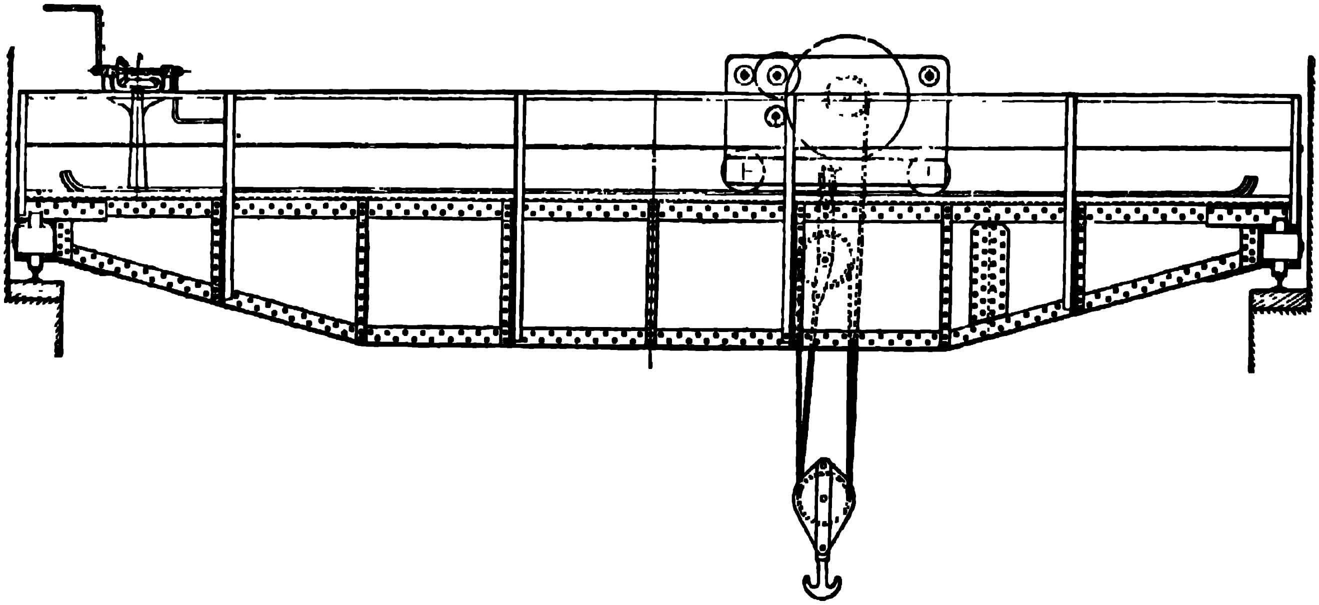
Rolled Steel Girder Overhead Travellers.



The above illustrates a type of Hand-operated Overhead Traveller of which we have constructed a large number. Several having capacities up to 6 tons are now in operation in Basra, Baghdad, and other centres in Mesopotamia in connection with the numerous steel buildings manufactured and erected by us there. The lifting, cross travelling and longitudinal travelling motions are all controlled from the floor level by means of hand chains.

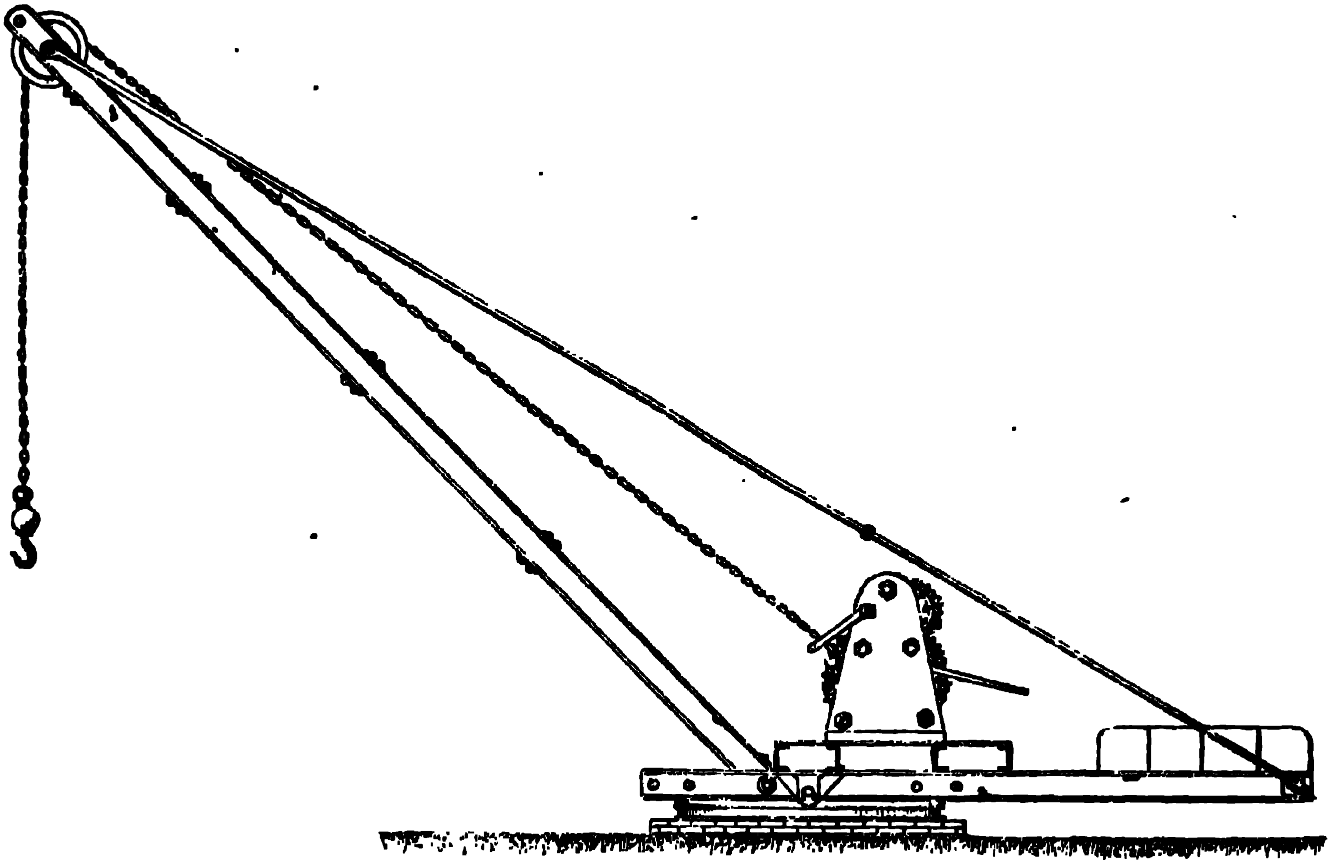
Built Girder Overhead Travellers.

Hand Power, with Treble Brake Crab.



This type of Hand-power Overhead Traveller is suitable for the very heaviest lifts, and the longest spans. All motions are controlled from the operating platforms at the level of the top of the girders. It is especially suitable for use in Power House buildings where very heavy lifts are frequently required. The illustration shows a 15-Ton Power House Crane recently manufactured by us.

Hand Crane with Slewing Gear.

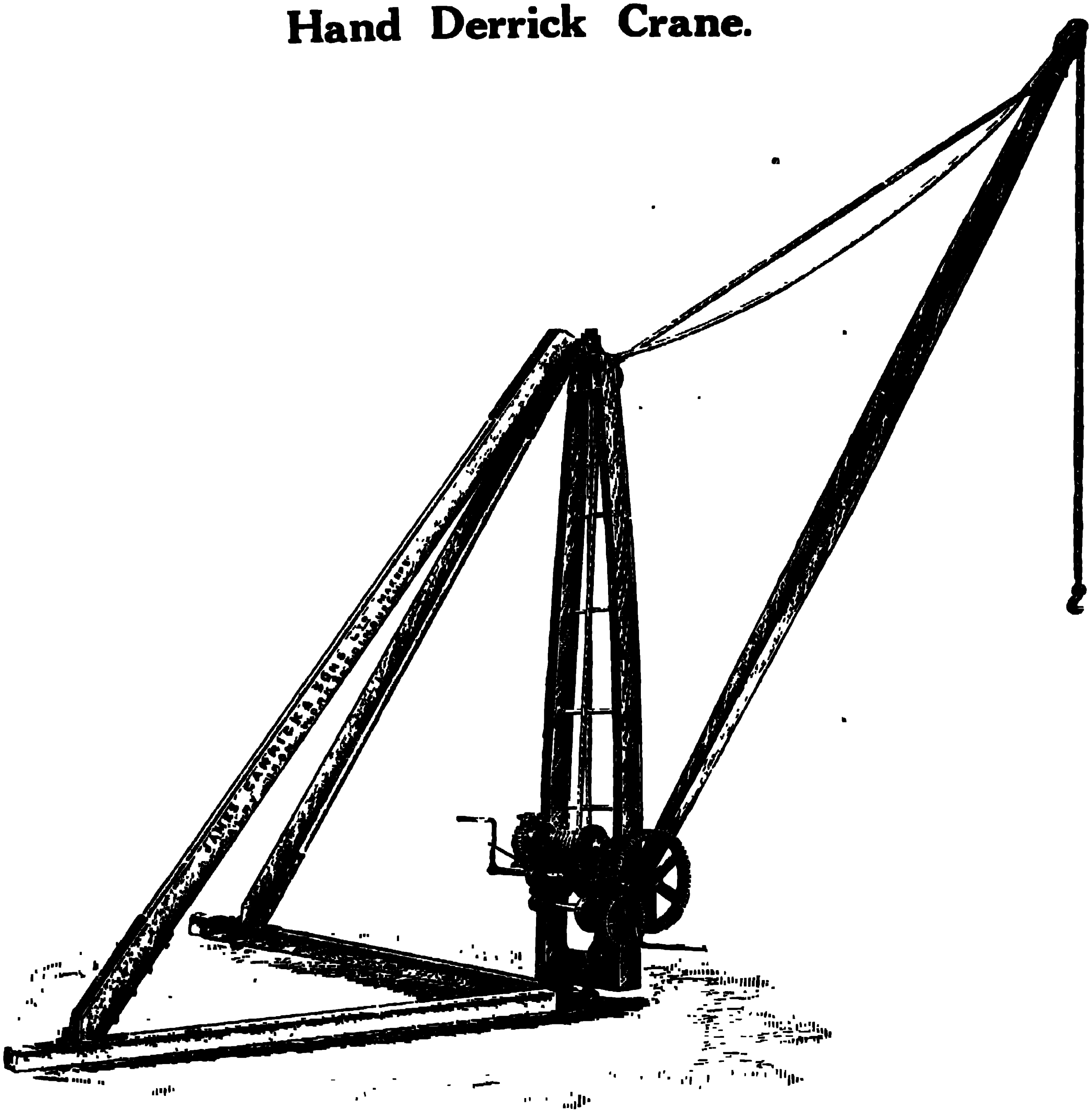


The illustration shows a handy Crane built almost entirely of mild steel and particularly suitable for mofussil use. It lends itself to being readily erected and is not liable to breakage by rough handling in transit.

The Crane, as illustrated, can easily be converted into a Travelling Crane, by mounting on a strong undercarriage and will be found very serviceable for Locomotive Coaling Stations or Contractors where a Crane built as the above is preferable to one with Cast-Iron Side Chucks or Vertical Posts.

Particulars and Prices on application.

Hand Derrick Crane.



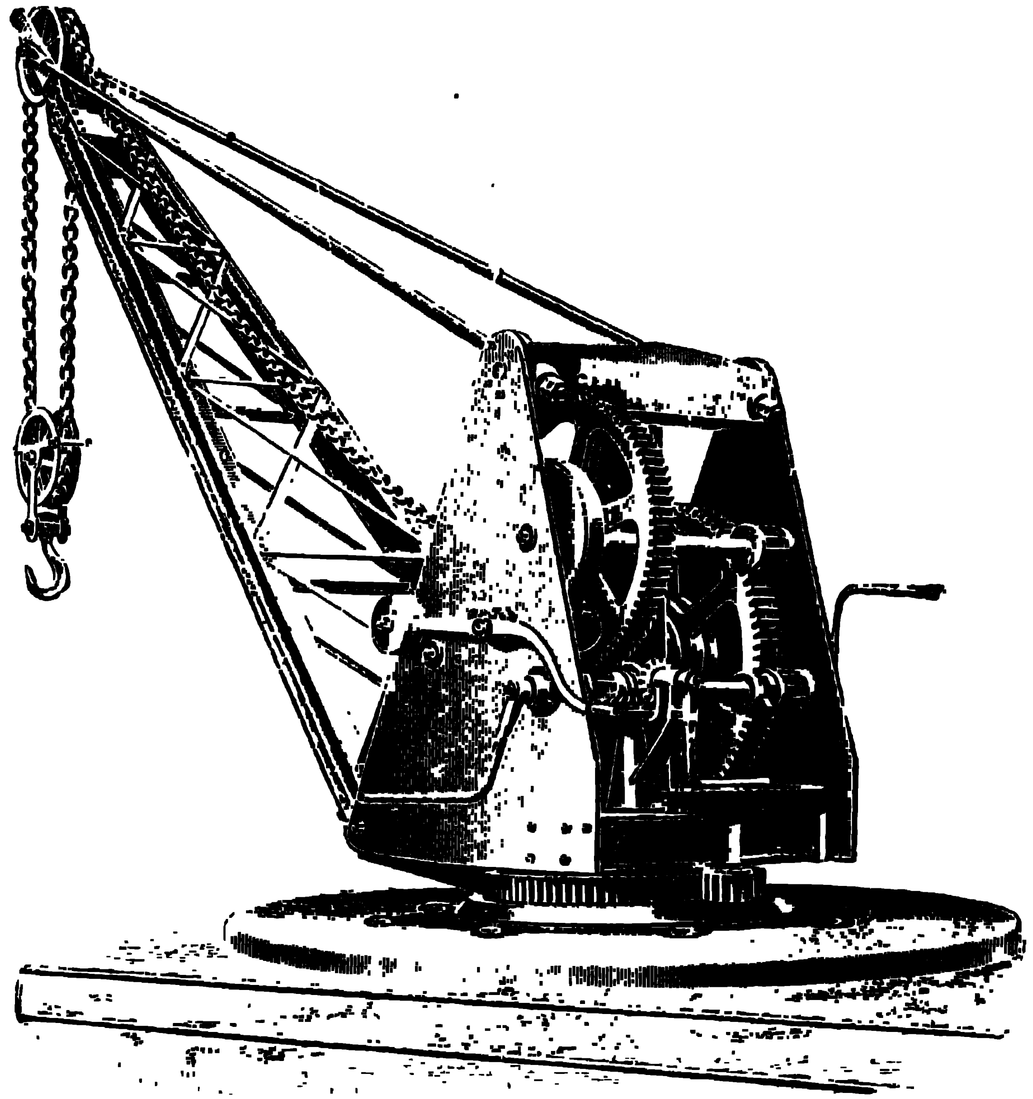
This is a particularly useful and handy Crane, suitable for use in Timber Yards and for Contractors, Shipbuilders, etc.

Particulars and Prices.

To lift .. .. .. tons	2	3	4	5
Length of Jib .. .. feet	40	40	40	40
Price .. .. .. **Rs.**	**2,080**	**2,600**	**3,120**	**4,330**
If fitted with Steel Lattice Jibs, Extra „	**1,020**	**1,020**	**1,150**	**1,200**

Prices of other sizes on application.

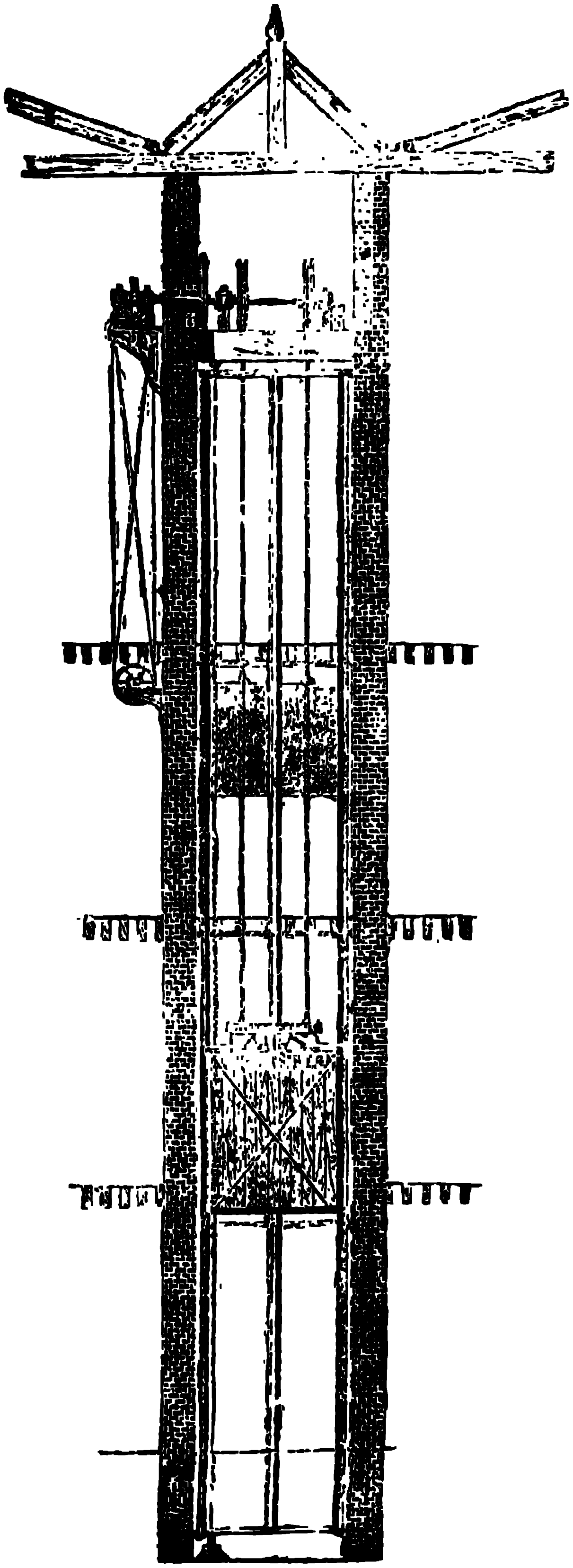
Fixed Hand Crane.



The above is the latest design of Fixed Hand Wharf or Railway Yard Crane. It is constructed from the highest class of material and workmanship, and is a thoroughly sound and reliable tool, complete with massive cast-iron base-plate, with the necessary foundation bolts and toe step for post, forged steel post, rolled plate side cheek with fixed shafts acting also as stays, bushed with gun-metal throughout; fitted with automatic brake with improved silent rachet pawls, slewing gear and ball bearings to the snatch block. Sufficient chain is supplied when necessary to reach 10 feet below wharf level.

Particulars and Prices.

Maximum Test Load .. .. .. tons	5	7	10
Radius of Jib .. .. feet	15	16	18
Approximate Total Weight .. .. tons	7	9	11
Price .. .. **Rs.**	**5,320**	**7,700**	**9,800**



Improved Hand or Power Hoist and Lift.

This Hoist is specially designed for Mills, Factories, etc., and is capable of lifting heavy weights at a maximum rate of speed, and can be used with safety for lifting passengers, goods or work-people.

It is fitted with powerful worm-gear, reversing motion and strong brake, and when complete with Patent Safety Gear, accidents from giving way of either gearing, bolts, or ropes, are impossible to the Cage or its contents.

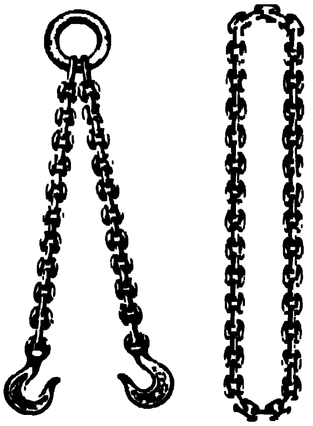
The Cage is made of angle iron or steel, and lined with wood work, and provided with a balance weight proportionate to the load. It stops automatically at the top and bottom with certainty and is very easily worked from any intermediate floor.

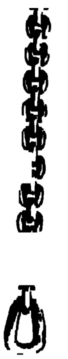
The Hoist is also designed to work with either spur or bevel gear, and when fitted with improved reversing gear, dispenses with the cross belt, only one belt being required.

We are in a position to supply designs and specifications for any size or power required; also for any other class of Lift or Hoist, Hand-power or Hydraulic, suitable for Hotels, Hospitals, Warehouses, etc., as desired.

Particulars and Prices on application.

Chains, Slings, Etc.





Chains, Short Link, Crane, B. B. B.

These chains are tested at the manufacturers' works to 15 per cent. over the Admiralty Tensile Strain and certificates of testing are supplied when required. Lloyd's Public Tests can be furnished at an extra charge.

The life of a chain can be greatly increased by periodical annealing and lubricating, and by taking care that the wear is uniform throughout the length, so that, when finally discarded, every link shall have done its full share of the work.

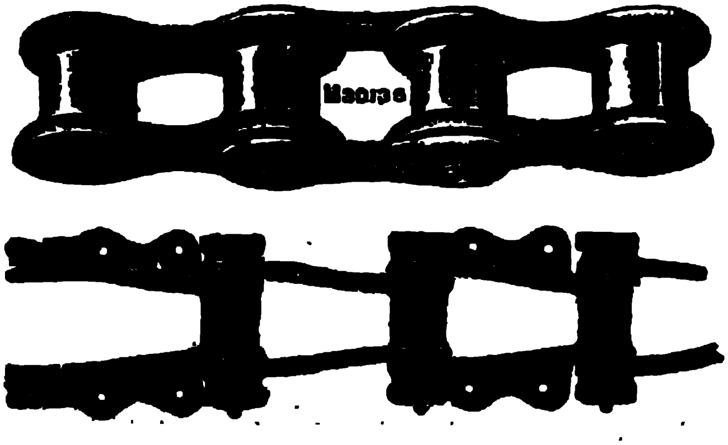
The testing should not be excessive, the working strain not exceeded. Chains which have severe and heavy work to do should be oiled with a brush once every week, and to effect this they should be slackened in order to get the oil between the links.

Size .. .. ins.	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Admiralty Tensile Strain Test Load tons	3/8	3/4	1 1/8	1 7/8	3	4 5/8	6 3/4	9 3/8	12
Safe Working Load .. ,,	1/4	3/8	11/16	1	1 3/4	2 3/4	4	5 5/16	7 3/16
Price per cwt. .. **Rs.**	**63 0**	**51 0**	**50 0**	**50 0**	**38 0**	**33 0**	**32 0**	**32 0**	**32 0**
,, ,, ,, if subjected to Lloyd's Public Test **Rs.**	..	..	..	..	**46 0**	**40 0**	**36 8**	**34 8**	**34 8**

Prices for other sizes on application.

Galvanized-Iron short link, best tested chain 3/16 in.—1/2 in.	**Rs. 84 0** per cwt.
Twisted iron chain for beam scales, etc.	**,, 70 0** ,, ,,
Steel land measuring chain, with arrows, size 100 feet .	**,, 21 8** each.
Dog chain	**,, 16 0** per doz. yds.

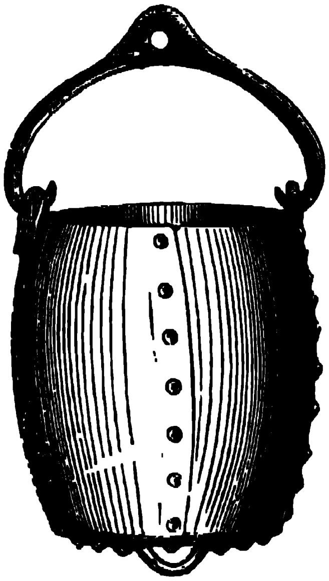
Stud Link Cable—Prices and sizes on application.

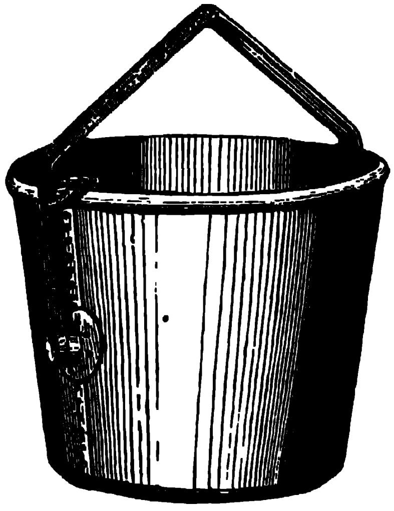


All types of chain for Motor Road Rollers, Elevators, Coal Conveyors, Lawn Mowers, Motor Trollies, Power Transmission, etc.

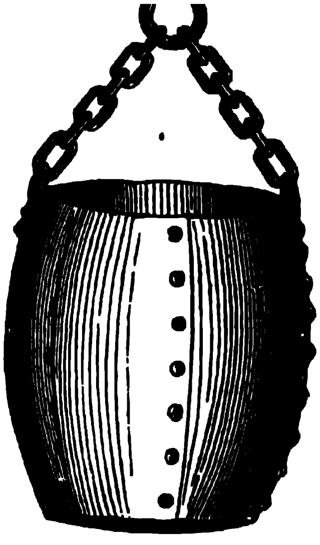
Prices on application.

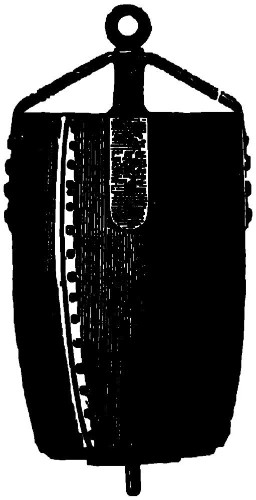
Kibbles.





B



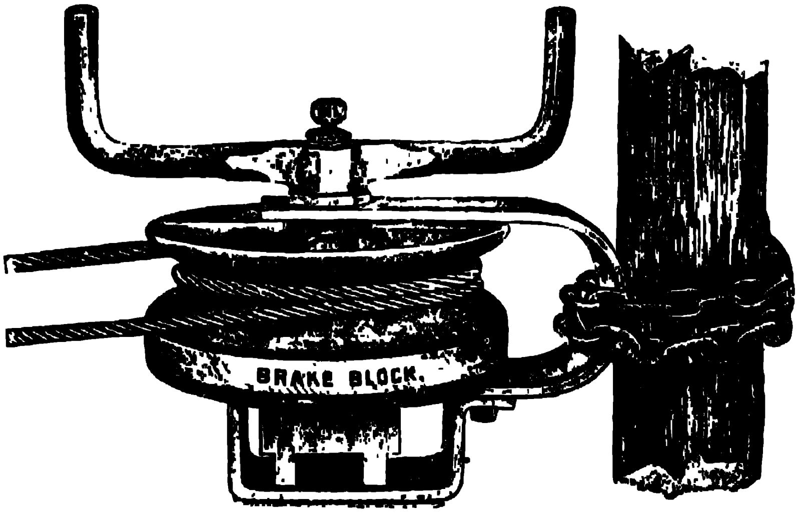


D

The illustrations show the type of Kibbles and Skips in general use. Strong iron or steel plates are used in their construction. All four types are made of the following sizes, but other designs and sizes can be quoted for on application:—

(*A*)—Ordinary Cornish Ore Kibble with wrought-iron bow.
(*B*)—Tipping Skip, self-discharging by raising the catch
(*C*)—Ordinary Cornish Ore Kibble with chain sling.
(*D*)—Water Kibble with automatic valve in bottom

No.	2	3	4	5	6	7	8	9
Capacity in cubic feet	5	10	15	20	25	30	40	60
Types A, B, C .. **Price, each Rs.**	**80**	**120**	**160**	**Prices of these sizes on application.**				
Type D .. ,, ,, ,,	**90**	**135**	**175**					



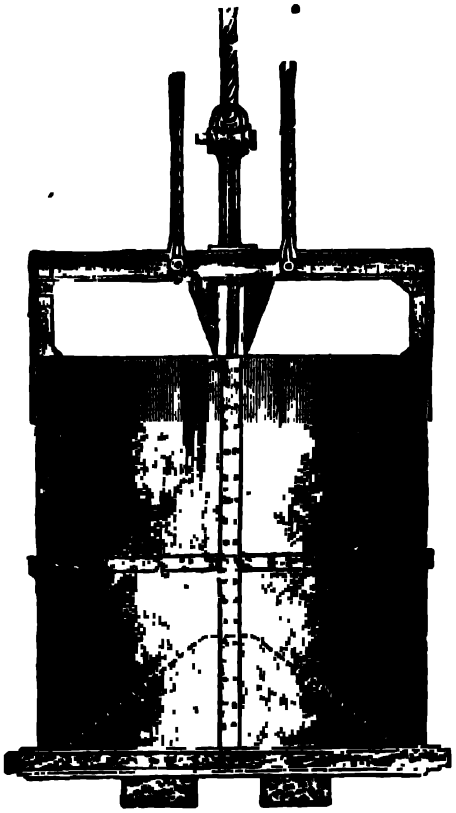
Patent Portable Brake Jig Pulley.

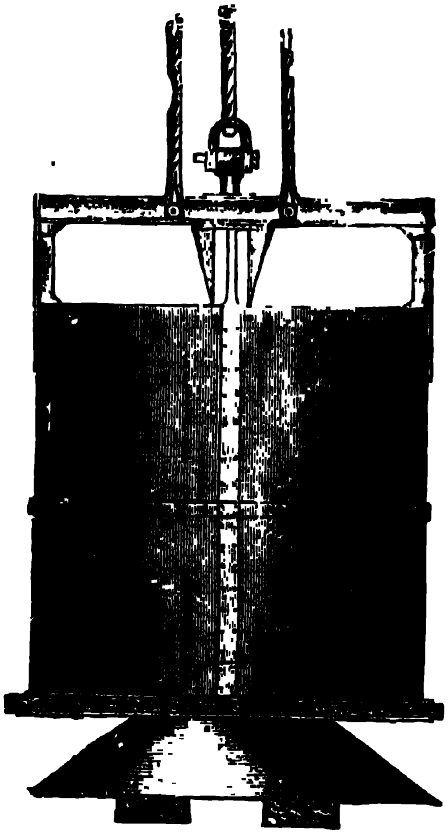
Can be used for either chain or flexible wire rope. Advantages:—Simplicity, lightness combined with strength, easy to fix and to operate, absolutely safe, and certain in action.

The easy gradual manner in which it can be applied prevents all shocks and liability of tubs being derailed. Once the brake is applied the tubs can be stopped and left with complete confidence in any part of the brow.

	Each. Price, Rs.		**Each. Price, Rs.**
12" Diameter at the bottom of groove	**120**	30" Diameter at the bottom of groove	**270**
15" ,, ,, ,, ,,	,, ,, **145**	36" ,, ,, ,, ,,	,, ,, **340**
18" ,, ,, ,, ,,	,, ,, **180**	42" ,, ,, ,, ,,	,, ,, **390**
24" ,, ,, ,, ,,	,, ,, **210**	48" ,, ,, ,, ,,	,, ,, **450**

Coal Loading Skips.





These skips are specially designed for discharging coal into the holds of vessels, but can be used for other purposes.

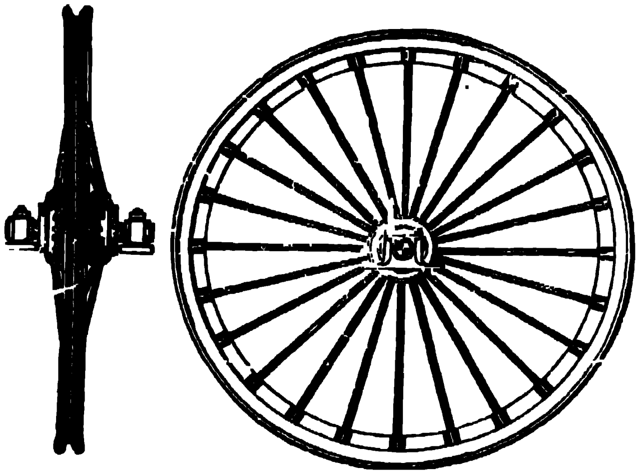
They are constructed of steel and may be made of any capacity to suit the crane power available. The conical bottom supporting the contents of the skip is hung on the centre wire rope, the two outside ropes being attached to the shell only. When it is desired to empty the skip the two outer ropes are shortened—independently of the centre rope—by means of a suitable arrangement fitted to the crane. This raises the shell above the cone and allows the contents of the skip to fall.

Full particulars and prices on application.

We shall be pleased to quote for Grabs, Skips, etc., according to the constituents' requirements on receipt of the necessary particulars.

Keps.

We manufacture several types of keps to suit different cages. The beams are frequently of timber supplied by the constituent, or, when made up by ourselves of plain rolled steel joists as shown in the illustration. The shafts are turned bright throughout their whole length.



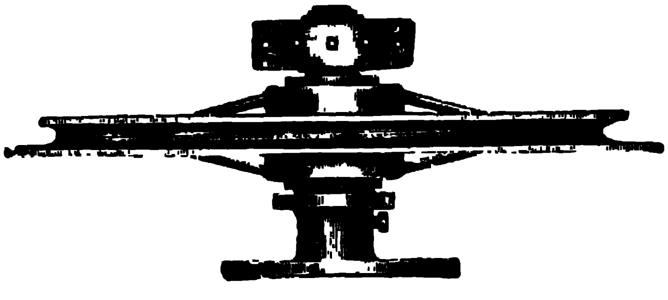
Pit Head Pulleys.

Complete with Spindles and Plummer Blocks.

We make these Pulleys of any diameter up to 12 feet and for either flat or round ropes. The rims and centres are of Cast-Iron and the arms are round bars of Wrought-Iron, thus securing great strength and at the same time a very light appearance.

The boss is bored and the shaft or gudgeon turned all over and keyed in, thereby ensuring the pulley running perfectly true.

Diameter of Pulley .. .. .. feet	4	4½	5	5½	6
„ „ Shaft .. .. .. ins.	3	3	3	3½	3½
Plummer Block Diameter .. .. „	2½	2½	2½	3	3
Plummer Block Length .. .. „	4½	4½	4½	5	5
Price, complete with Shaft and Plummer Block **Rs.**	**230**	**275**	**315**	**360**	**415**

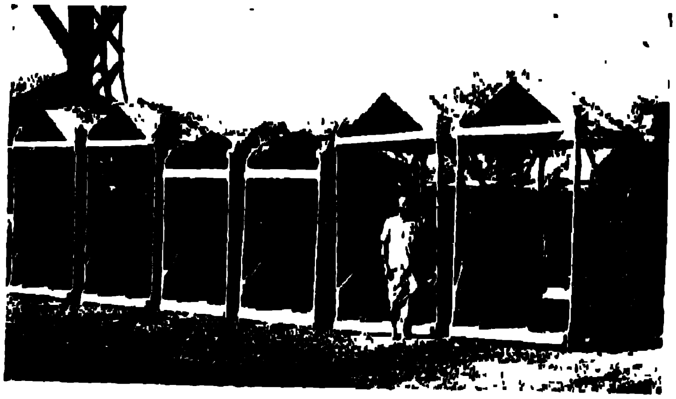


Guide Rope Pulleys.

Guide Pulleys for inclines made of special Cast-Iron. Pulleys are fitted with extra large steel pins to ensure steady running.

Full particulars and prices on application.

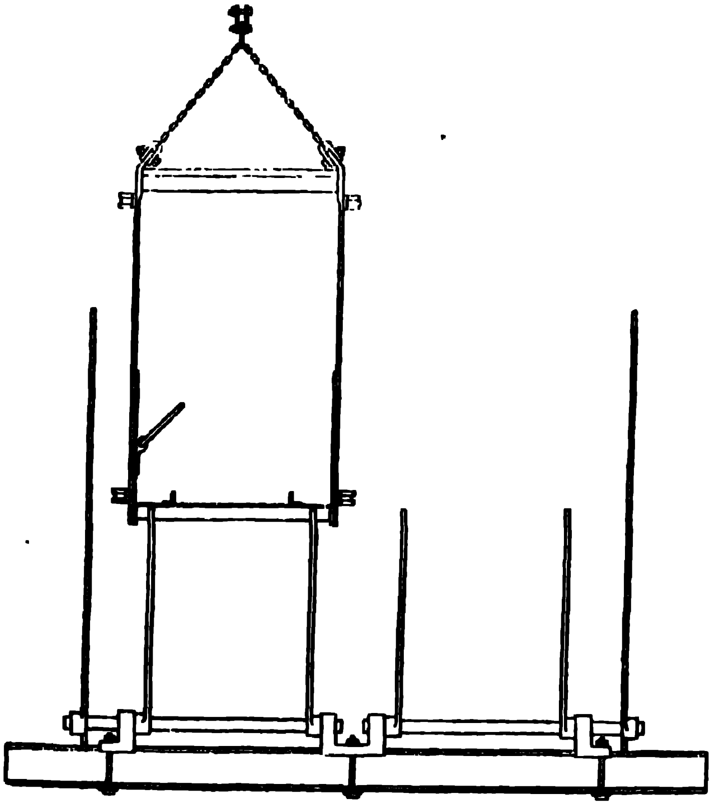
Pit Cages.

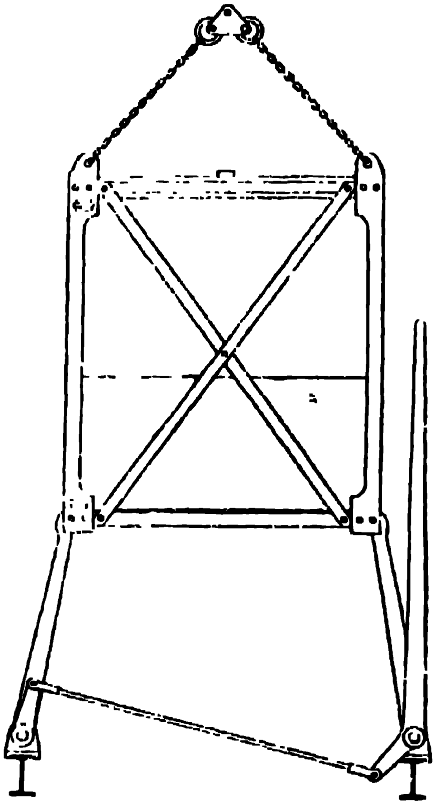


Pit Cages of our standard design or to meet the requirements of our constituents are amongst our standard products.

They are designed for single, double or treble decks, each carrying one or more Tubs, are constructed entirely of Steel, and fitted with Guide Blocks for Rope Conductors and Catch Bars for Tubs.

It need not be emphasised that the successful working of a pit depends absolutely on the reliability of the cages.





Full particulars and prices on application.

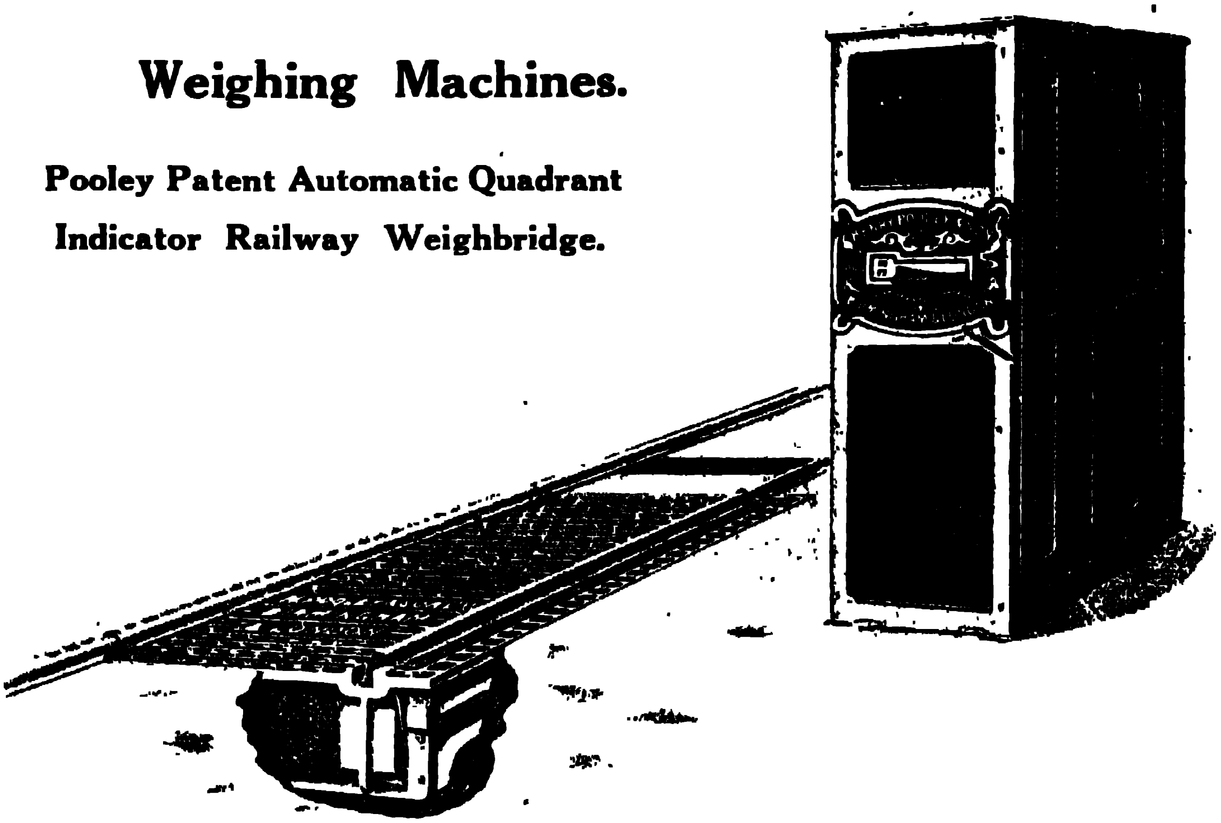
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

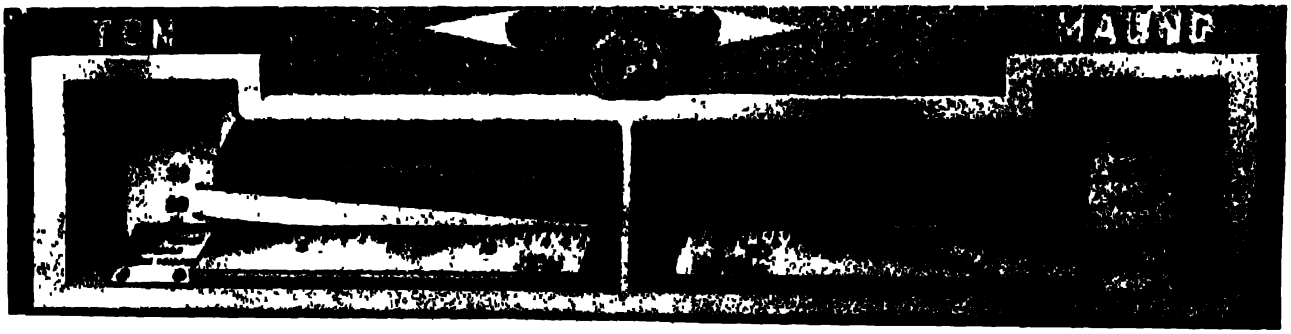
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Weighing Machines.

Pooley Patent Automatic Quadrant Indicator Railway Weighbridge.





The Patent Automatic Indicator is specially designed for rapid and accurate readings. It is also fitted with a jamming handle to allow loads to pass over the platform that do not require to be weighed thus saving unnecessary shocks and reducing the wear on the more delicate parts.

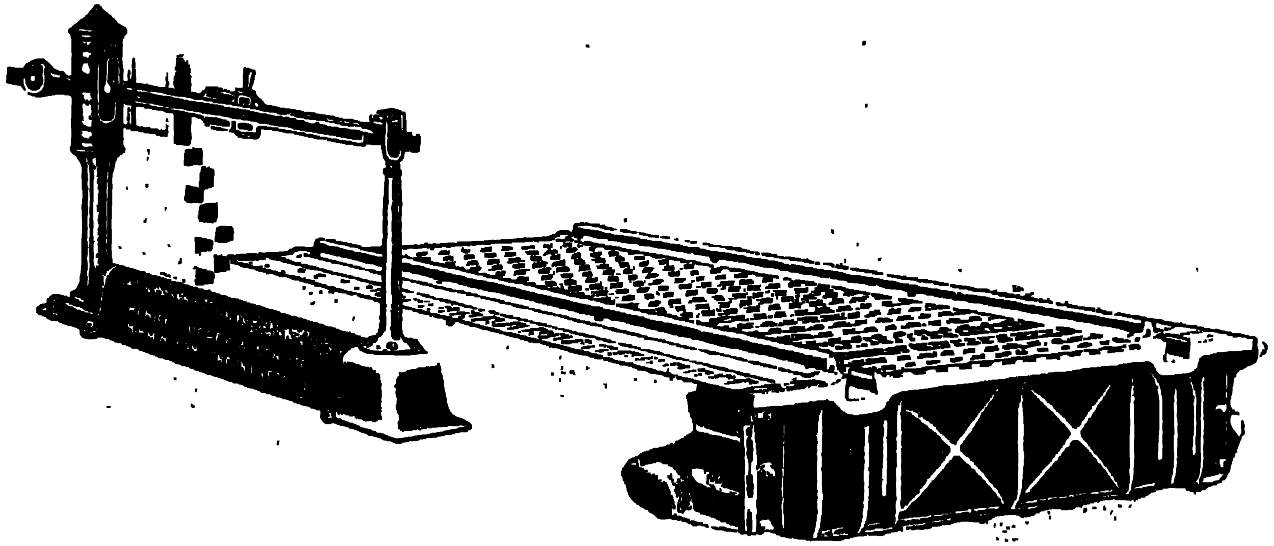
The indicator is graduated up to the full capacity of the machine in either English, Indian, or both Standard weights.

Full particulars on application.

Self-Contained Railway Weighbridge.

No. 503.

Capacity up to 60 Tons.



Designed to withstand the wear and tear of main-line traffic without the use of relieving gear.

General Description.—The weighbridge is of the Pooley well-known self-contained construction, Fig. No. 503. The working parts are enclosed in a strong cast-iron frame, having the meeting flanges machined and bolted together with improved joggle joints.

The frame is provided with broad flanges top bottom, the latter ensuring an evenly distributed load over the foundations.

Supports are cast on the end frames, these are machined to receive the interchangeable and replaceable steel seating blocks, from which the steel swings are suspended for carrying the fulcrum knives of the main levers. Accuracy of level and perfect alignment, which is the crux of weighing efficiency, is thus assured.

Solid supports are cast on the end frames to take the weighing girders when the weighbridge is dismantled for repairs, thereby keeping the roadway open and so preventing traffic congestion.

Levers.—Cast-iron, designed to ensure free oscillation of the working parts in the direction of the traffic, thus prolonging the weighing accuracy for the longest possible period.

Swings.—**Cast-steel,** fitted with hardened steel Bearing Blocks.

Main Knives.—8 ins. long. The bearing surfaces consist of the Best High Carbon Steel welded into solid blocks of best Swedish Iron.

Girders.—Rolled Steel, sound and free from flaws, and of ample strength and rigidity to carry loads up to the full capacity of the machine with an ample margin of safety stress upon the metal.

Platform.—Chequered Plates are arranged in sections to allow access to the working parts in the pit without disturbing the rails. Length, 14 to 20 feet.

Steelyard—"Unique."—Entirely dispensing with loose weights, and have been designed to overcome objections raised against various forms of "no-loose-weight" steelyards hitherto in use, as well as to meet all the requirements of the Board of Trade Regulations, 1907.

The Travelling Poise is irremovable, and its weight is reduced to a minimum.

All knife-edges and seating steels are of the highest quality and are interchangeable.

Capacity.—Designed for capacities up to and including 60 tons.

Gauge.—Various to suit gauge of Railway.

Price.—25-Ton Weighbridge built to 60-ton strength for passage of Locomotives. Platform 20 feet long fitted with rails to Standard Broad Gauge .. .. **Rs. 14,000**

Do. **do.** **do.** **Metre Gauge** .. .. .. **„ 11,800**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

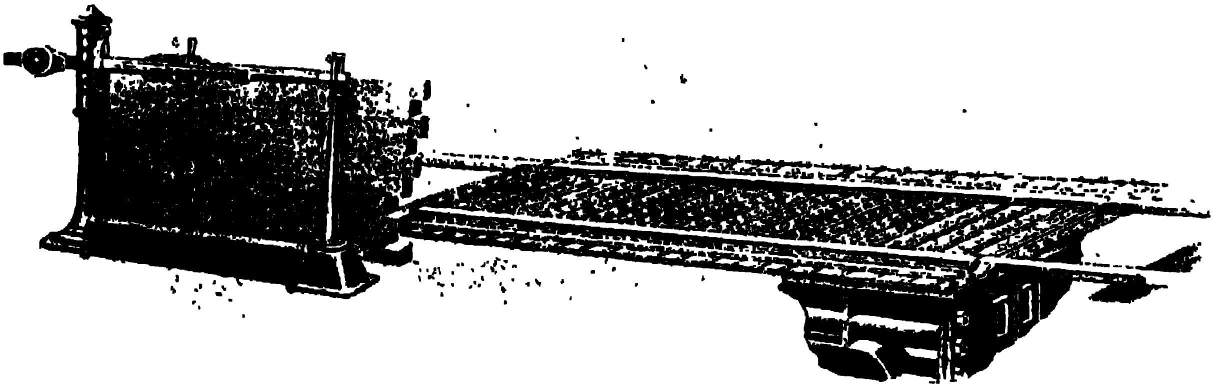
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Self-Contained Railway Weighbridge.

No. 504.

Capacity up to 30 Tons.



General Description.—The Weighbridge is of the Pooley well-known self-contained construction, Fig. No. 504 The working parts are enclosed in a strong box formed of cast-iron girders, having their meeting flanges properly machine surfaced and bolted together with improved joggled joints. Brackets are cast on to carry the weighing levers, thus ensuring accuracy of level and reducing the cost of foundations to a minimum. Solid supports are provided to take weighing girders when machine is dismantled for repairs.

Main Underneath Weighing Levers.—These are of cast-iron of approved design, arranged to ensure free oscillation of the working parts in the direction of the traffic, thereby preventing unnecessary wear to the lever knife edges. They are carried in swinging fulcra links, suspended from strong brackets, cast on to box ends.

Main Knife-edged Centres.—These are formed of double shear steel properly welded into forged blocks provided with screwed shanks, all finished to a true plane, and properly hardened. They are fitted to machined beds and are interchangeable.

Girders.—The weighing girders are of cast-iron, sound and free from flaws, and of ample strength to carry loads up to the full capacity of the machine in addition to the weight of the platform.

Platform.—Of cast-iron, sound and free from flaws. • It is in sections so arranged as to allow of access to the levers without disturbing the roadway over the machine. Length, 14 and 16 feet.

Rails.—Steel rails of approved section properly bolted on to the girders.

Steelyard—"Unique."—Entirely dispensing with loose weights and fitted with concealed balancing gear, all in accordance with Board of Trade Regulations, 1907.

Capacity.—Designed for capacities up to and including 30 tons.

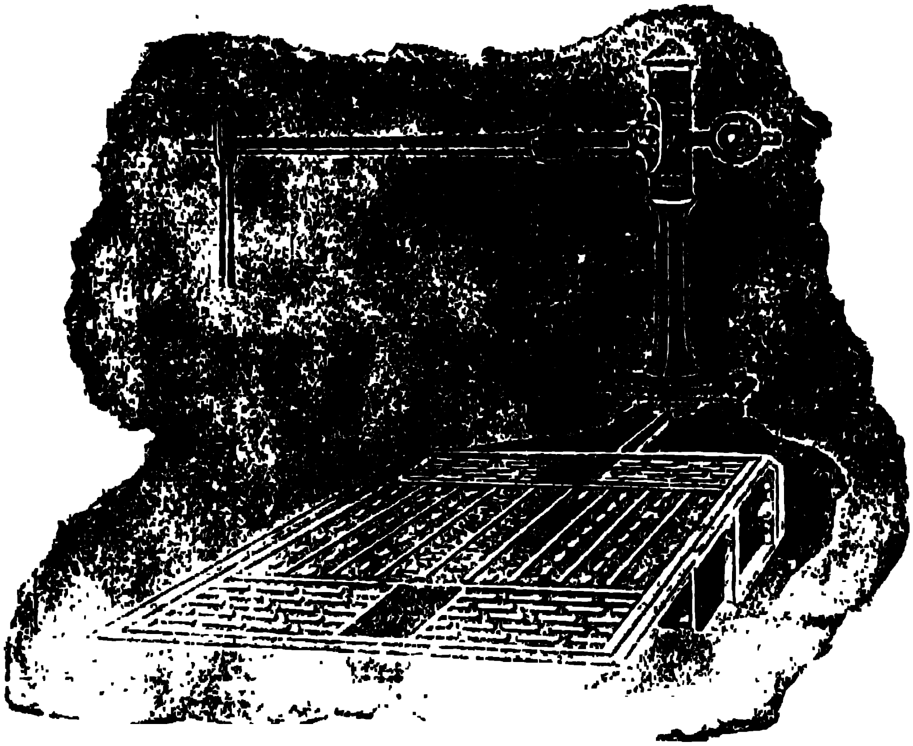
Gauge.—Various to suit gauge of Railway.

Price.—25-Ton Weighbridge. Platform 16 feet long fitted with rails to Standard Broad Gauge, **Rs. 9,650**
Do. do. do. Metre Gauge .. .. „ **8,250**

Self-Contained Indian Cart Weighbridges.

Fig. No. 528.

Capacity up to 5 Tons.



English and Indian Standard of Weighment.

No Loose Weights.

Specially designed for weighing two wheeled bullock carts.

This weighbridge is of the self-contained type, constructed entirely of Steel and Iron, and in sections to facilitate transport and fixing.

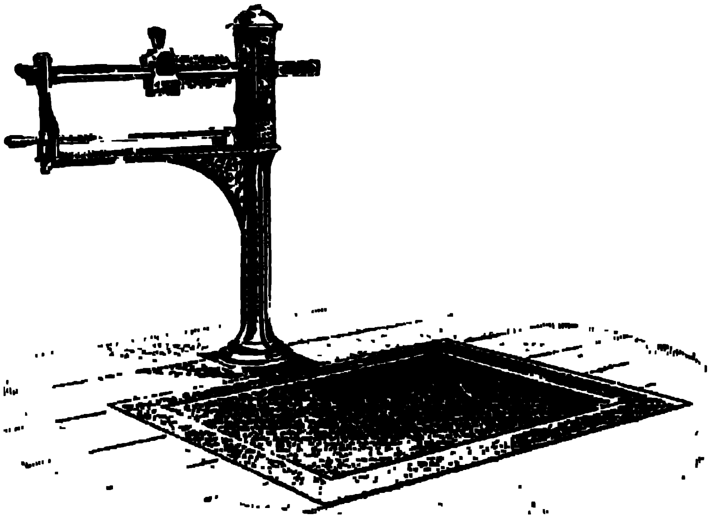
The platform has a free and almost frictionless motion in all directions given to it, and has on its surface a suitable roughing to give a foothold and hollows to take the wheels of carts. The steelyard has no loose weights and is graduated in English and Indian Standards.

Capacity	tons	2	3	5
	maunds	60	82	136
Size of Platform	feet	6×3½	6×4½	6×6
Price	**Rs.**	**1,750**	**1,895**	**2,800**

Warehouse Weighing Machine.

Dormant Type.

No. 71.



Constructed entirely of metal, with finest hardened steel knife-edges and bearings.

Steelyard " Latch " no-loose-weight type.

The frame is suitable for building into any type of floor, whether of brick, concrete, steel or wood.

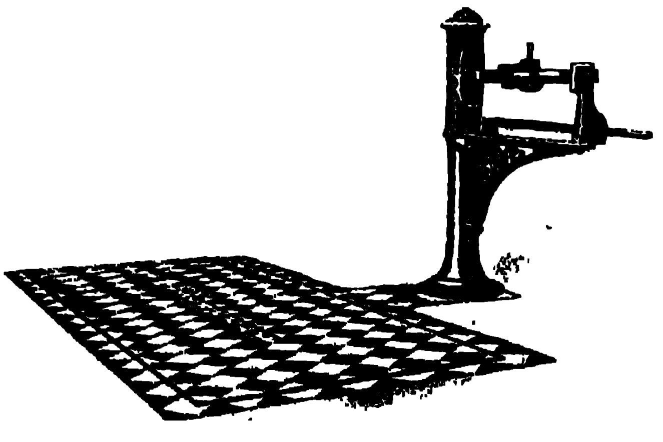
This machine can be supplied with " Loose-weight " steelyard, to weigh in any one or two National Standards without extra charge.

Capacity		cwts.	5	10	20	30	20	40	20	40	50	30
Dimensions of Platform	Length ..	ins.	24	30	36	42	48	48	48	55	54	72
	Width ..	„	24	30	36	42	36	36	48	43	54	48
Price		Rs.	**590**	**840**	**1,170**	**1,410**	**1,275**	**1,425**	**1,470**	**1,780**	**1,980**	**2,100**

Passengers' Luggage Weighing Machine.

No. 1072.

Fitted with " Latch " No-Loose-Weight Steelyard and Relieving Gear.



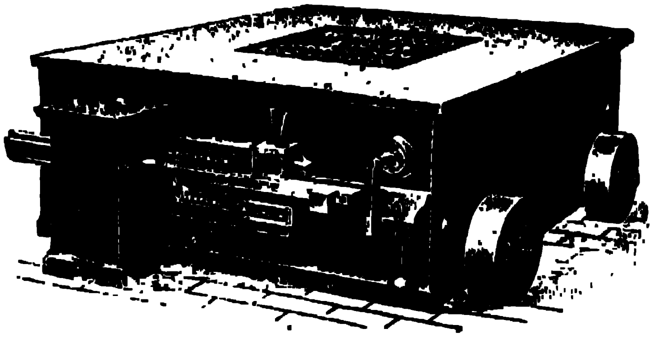
Specially constructed for weighing passengers' luggage on Railway Stations. Entirely of metal, with finest hardened steel knife-edges and bearings. Of specially high-class finish and of extra strength.

Steelyard " Latch " no-loose-weight type, graduated in any National Standard or in two National Standards.

Capacity, 20 cwt. Size of Platform, 6 ft. by 4 ft. Price, Rs. 1,855-0.

Special Warehouse Weighing Machine.

No. 1066. Portable Type.



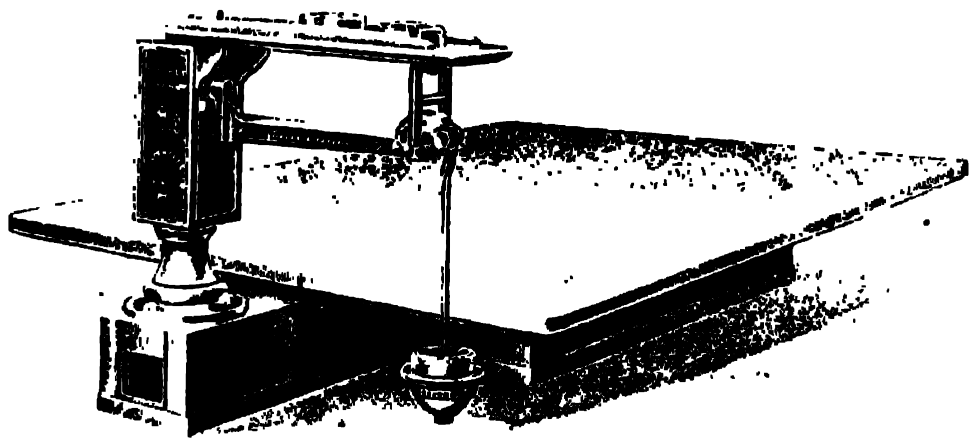
This machine is specially designed for weighing steel bars, sections, pig-iron, etc. As will be seen from the illustration the steelyard and pillar are below the level of the platform. Long bars can therefore be placed across the weighing platform in either direction without the possibilities of coming into contact with any portion of the machine

All of special quality and strength. Mounted on four wheels. Steelyard "Latch" no-loose-weight type to weigh in any national standard.

Capacity, 30 cwts. Size of Platform, 38 by 44 ins. Price, Rs. 1,660-0.

Cotton and Jute Weighing Machine.

No. 54.



This machine has been specially designed for weighing loose cotton, jute, etc., before baling.

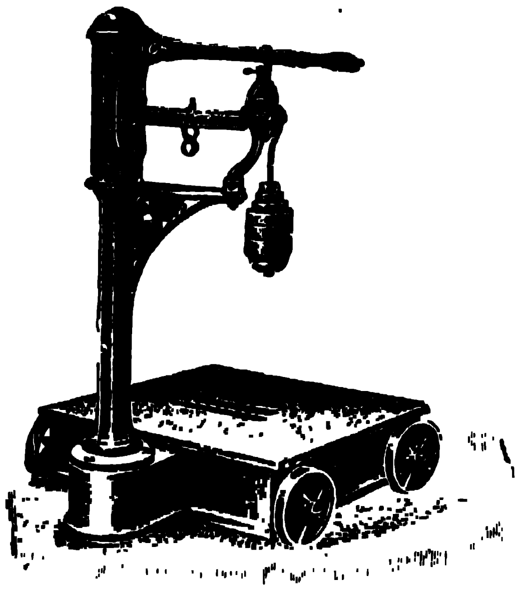
It is of metal throughout, with the exception of the platform, which is made of finest seasoned Birch. Only the very best wood is used and the platform is very carefully made and finished.

The steelyard is not graduated and we supply a series of proportional weights, adjusted to balance a quantity of material suitable for bales of different weights.

These weights can be made to suit users' requirements, but those usually supplied represent the following weights:—

Cwt.	1	3	3	3	3
Qrs.	3	0	0	1	2
lbs.	0	0	14	0	0

Capacity, 3½ cwt. Size of Platform, 70 by 53 ins. Price, Rs. 1,200-0.



Portable Platform Weighing Machine.

No. 1104.

With English and Indian Weights.

This machine is the "general purpose" Platform Weighing Machine. It is constructed entirely of metal with hardened steel knife-edges and bearings, and fitted with Relieving Gear It is suitable for railway, general warehouse and stores use where it is necessary to move the machine from one place to another, and will withstand any amount of hard wear and usage Mounted on four strong wheels Attention is particularly invited to the enclosed balancing arrangement whereby the balance of the machine is protected from the interference of unauthorised persons.

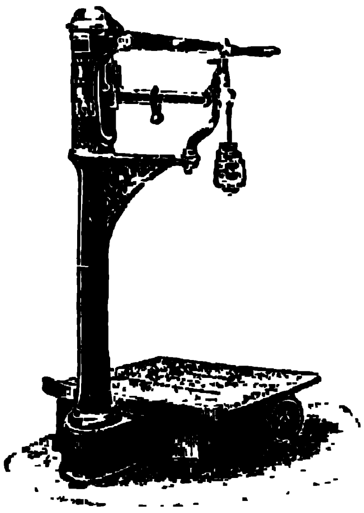
Capacity .. .. .. cwts.		3	5	10	15	20
Dimensions of Platform	Length .. ins.	24	24	30	35	36
	Width „	24	24	30	33	36
Price .. .. .. Rs.		290	330	500	615	720

The above machine can be fitted with a backrail at a small extra cost.

Small Portable Platform Weighing Machine.

No. 1106.

With English and Indian Weights.

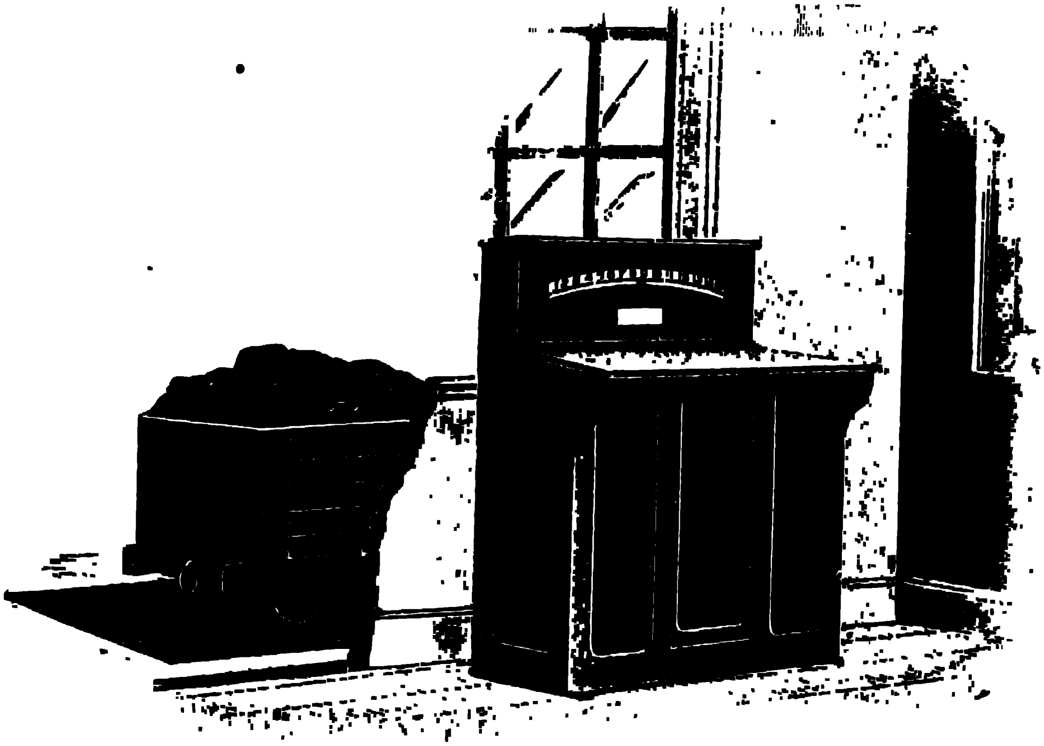


These are of the same pattern as No. 1104 illustrated above, excepting that they are mounted on two wheels

Capacity .. .. .. cwts.		3	5
Dimensions of Platform	Length .. ins.	24	24
	Width .. „	24	24
Price .. .. .. Rs.		275	320

Patent Self-Indicating Pit Bank Weighing Machine.

No. 87.



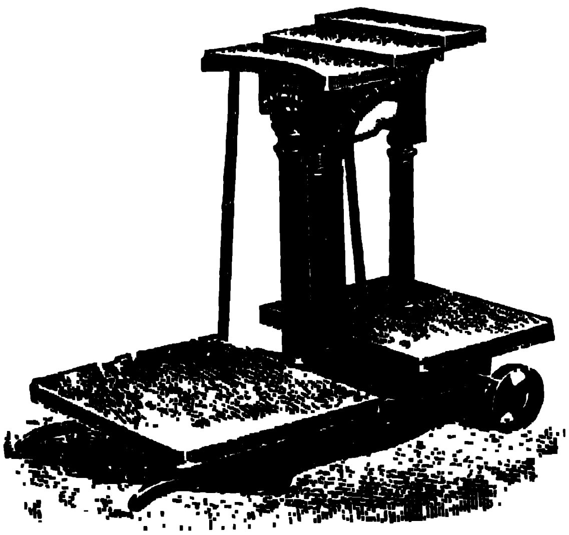
There are no loose weights. The taring arrangement is very simple and may be set by means of a thumb screw. A ready means of keeping the platform level with the pit head is provided by the machine itself. This arrangement belonging exclusively to the makers—will be appreciated by colliery owners and managers.

Weighing capacity to suit requirements up to 30 cwt. gross.

Full particulars and prices on application.

Equal Balance Sack Weighing Machine.

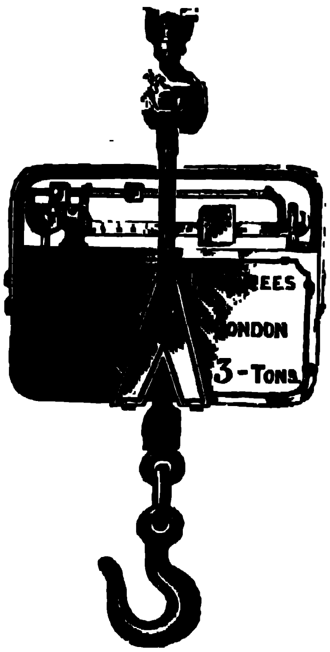
No. S. 112.



For Farmers, Millers and General Purposes.

Iron Frame, Beam, etc., hardened steel knife-edges and bearings. Fitted with handles and wheels and iron side straps.

Capacity	.. cwts.	2	3	4
Dimensions of Platform	Length ins.	17	20	22
	Width „	14	17	18
Price ..	.. Rs.	190	200	300



Pooley Patent Crane Weighing Machine.

No. 95.

Of very superior design and finish. To secure lightness, with an ample margin of strength, the levers and principal parts are made of steel. The indicator is arranged to dispense with loose weights and is protected from injury by the cover, as shown in the illustration. Can also be supplied with automatic dial instead of steelyard.

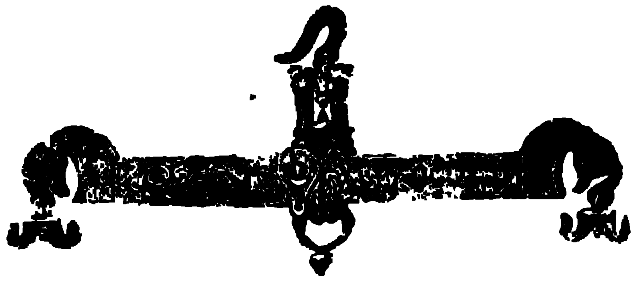
Tons							
Price	**Rs.**	**600**	**825**	**990**	**1,260**	**1,590**	**1,800**

Prices of larger sizes up to 60 tons on application.

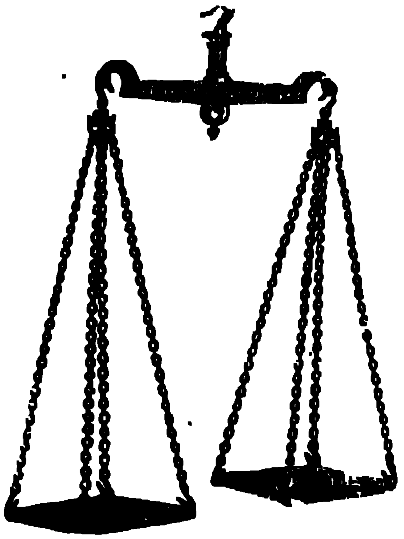
Square End Weigh Beams.

No. S. 303.

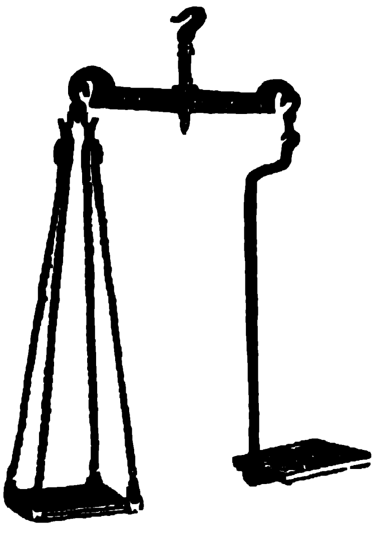
Length of Beam. ft.	3	3½	4	4½
Capacity mds	1	2	3½	5
Price Rs.	**95**	**110**	**140**	**225**



Suspended Scales with Chains.



Suspended Scales with Crank.



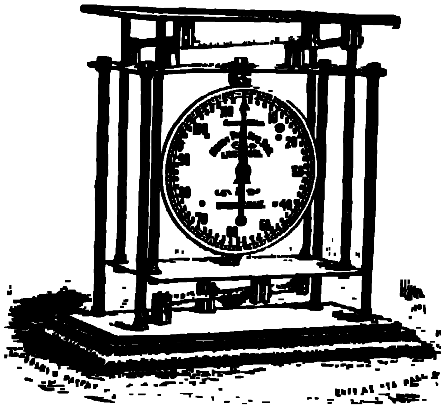
Scales.

We supply these Scales of ordinary plate-iron, galvanized-iron, or wood, with chains, or with cranks, as desired.

Prices on Application.

Counter Platform Weighing Machine.

With Automatic Dial Indicator.



This machine is of special design and has proved very successful in use in Railway Parcels offices.

The Dial, being underneath the Weighing Platform, cannot be damaged when parcels are thrown on to the machine.

The dial can be graduated in any one National Standard without extra charge, or in two National Standards at a small extra.

Capacity 1 cwt. by ½ lb. Size of Platform 16 by 9 ins.

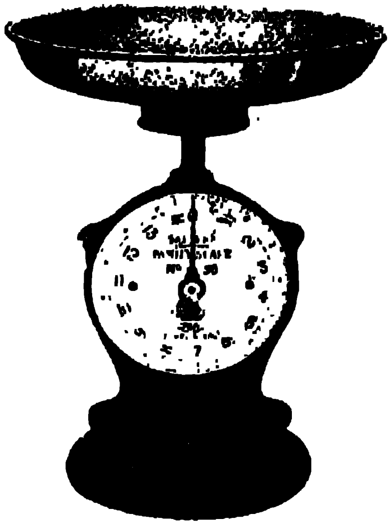
Price, Rs. 220-0.

Family Spring Balances.

Round Pan.

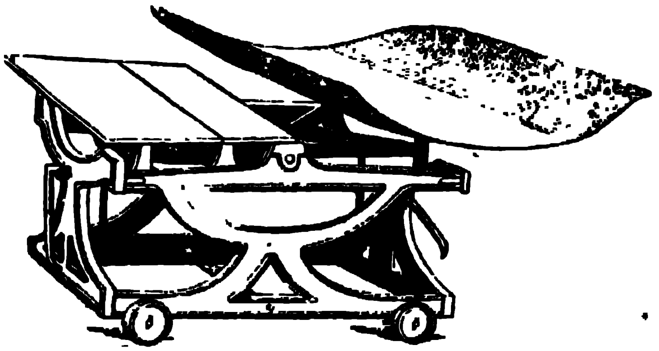
These machines are now made on an improved principle and will show the correct weight in whatever position the goods may be placed.

To weigh 14 lbs. by 1 oz.	.. **Price, Rs.**	**15-0.**
„ 28 „ „ 2 oz.	.. „ „	**18-0.**
„ 50 „ „ 2 oz.	.. „ „	**21-0.**



Sensitive Weighing Machines.

For Cloth, Yarn, etc.



Capacity 1½ cwts. Size of goods scale 18 by 24 ins.

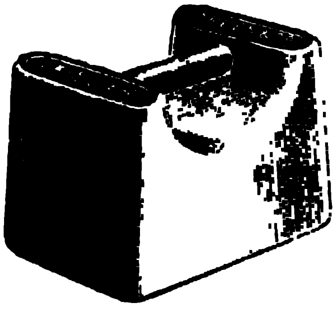
Price, Rs. 80-0.

Capacity 3 cwts. Size of goods scale 24 by 31 ins.

Price, Rs. 105-0.

Weights.

Iron English Weights.



Iron Bar Weights.

LBS. .. .	56	28	14	7	4	2	1	½	¼
Bar or Flat, each Rs.	10-0	6-0	3-8	2-0	1-4	0-12	0-8	0-6	0-5

OZS	2	1	½	¼
Flat Brass, each .. Rs.	1-0	0-12	0-8	0-8

Price, per set ½ oz. to 56 lbs. Iron, **Rs. 25-0**

Iron Bazar or Factory Weights.

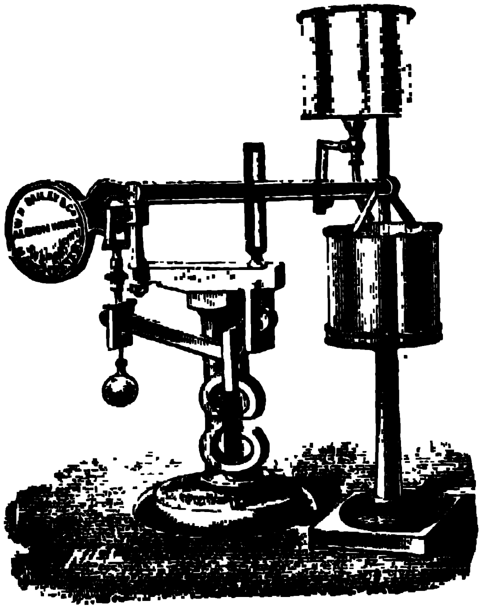
MAUNDS			¼
Ring, each .. .. .. Rs. ..	15-0	9-0	5-0

SEERS	5	2½	2	1	½	¼
Ring or Flat, each Rs. ..	2-12	1-8	1-4	0-12	0-8	0-6

CHATTACKS			½
Flat Brass, each Rs.	1-0	0-12	0-8

Price, per set ½ chattack to 1 maund, **Rs. 35-0.**

Cement Testers.



These table pattern Cement Testers are useful instruments for Engineers and others engaged on constructional work where large consignments of cement are used and have to be tested. The testers are also suitable for laboratory work. The cement tester can be supplied with or without an automatic shot-filling arrangement. The section taken is 1 in. by 1 in. The strain is applied by pouring shot into the can at the end of the lever until the cement block is fractured. Strains up to 1,000 lbs. can be obtained. A small weighing machine, with equivalent dial, is supplied with each machine.

Tester Complete with Automatic Filler and three Moulds.

Price, Rs. 750 each.

Spare Moulds guaranteed accurate to British Standard requirement ..	**Rs. 25 each.**
Vicat Needles	**„ 95 „**
Le Chatelier Gauges	**„ 8 „**

"Bulldog" Grinding Wheels and Abrasives.

By the British Abrasive Wheel Co., Ltd.

The cutting materials used in grinding wheels are of the first importance. They may be Natural or Artificial, but in choosing them it is not possible to say which is the better, until the purpose for which the wheels are to be used is known.

This point has been studied with great care during the past few years and abrasive materials have passed through many stages of development until that of the present day when Mechanical Grinding is looked upon as a fine art requiring expert knowledge.

Formerly grinding wheels were mostly made of Emery, but in recent years scientific investigation coupled with the facilities afforded by modern science has enabled manufacturers to produce abrasive wheels containing a much higher percentage of oxide of alumina, the constituent upon which the hardness and cutting properties of the wheel depend. These present-day products are marketed under several proprietory names such as—Corundum, Krysilide (carborundum), Electrundum, etc.

The raw materials forming the basis of each class is fused at a great heat in special electric furnaces and afterwards allowed to crystallise. The masses of crystals are reduced to grain form by means of powerful crushing machines, which break up the aggregations of crystals, and after being washed, refined, and graded, are made into wheels or other shapes with silicates, shellac, rubber or special organic bonds according to the class of product required.

Vitrified Wheels are made in accordance with the class of work for which they are intended and are most suitable and efficient for the greatest number of grinding operations. The process of vitrification consists of mixing the grain or grit with clays of high tensile strength and with fluxes which themselves possess grinding properties; the mixture is then drawn off into suitable moulds, carefully dried, and subsequently burnt in special furnaces or kilns, at an extremely high temperature.

Wheels manufactured by this process are not affected by water, by acids or by changes of temperature. They can be used wet or dry, and, as their structure does not change, they can be kept in stock for indefinite periods.

Silicate Wheels are manufactured by a semi-vitrified process and are specially suitable for Tool Grinding, Knife Grinding, Surface Grinding, etc. The process consists of mixing the selected abrasive with Silicate of Soda and other ingredients, putting into suitable moulds and heating.

The peculiarity of the Silicate Wheel is its capacity for free cutting without generation of heat—qualities of primary importance, as for instance in magnet grinding. There are certain classes of work that can be done economically, using silicate bonded wheels, but presenting difficulties if an attempt be made to utilise the vitrified type.

Elastic Wheels are used for Gear Grinding, for sharpening Moulding Cutters, Grinding Rolls, Wood Working Tools and for Grinding Aluminium, Copper and other soft metals, etc. They possess a high degree of elasticity and safety and can be made as thin as $\frac{1}{16}$th of an inch.

Rubber or Vulcanite Wheels are made for special grinding operations where the grinding wheel is subjected to great lateral stress while in operation thus demanding a wheel of high tensile strength.

In the vulcanite process the grit is mixed with India Rubber and Sulphur, moulded to shape, subjected to high pressure and subsequently vulcanised.

The range of grades which can be obtained by the use of the rubber process is not nearly so wide as with the vitrified process, so that Rubber Wheels are not found to be efficient for as many classes of grinding as are the Vitrified Wheels and are usually only selected when the necessity for a high factor of safety is an outstanding feature.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Bulldog" Grinding Wheels and Abrasives.

Grain and Grade.

The Grain of a Grinding Wheel means the size of the cutting particles—that is the abrasive used in making the wheel. The abrasive materials used are sized through carefully made screens into grains of the following sizes:—6, 8, 10, 12, 14, 16, 20, 24, 30, 36, 46, 54, 60, 70, 80, 90, 100, 120, 150, 180, 200, and flour. No. 6 is the coarsest grain and 200 the finest. By way of a clear conception of the meaning of grain, it may be stated that No. 30 grain, for example, is a particle of such sizes as will pass through a screen having thirty meshes per lineal inch or 900 meshes per square inch.

Grade is a term used to denote the hardness of a wheel. It actually represents a measure of the strength of the bond or the cohesive force exercised by the bond to retain the grain in its setting. Wheels are graded from soft to extremely hard, in the majority of cases, the grade being denoted by the letters of the alphabet from F to X inclusive. The grade of a wheel for any particular work should be selected so that it will neither glaze nor wear excessively, but furnish a fresh cutting face as fast as the particles of abrasive grain become dull. A proper wheel should keep itself sharp automatically by use without excessive wear or dressing.

Operating Speeds for Grinding Wheels.

The grains and grades of grinding wheels, other than those made by the elastic and rubber processes, are established in accordance with certain standards, and for ordinary grinding purposes it is recommended that these wheels be operated at a speed of from 5,000 to 6,000 peripheral feet per minute.

A peripheral speed of 5,000 feet per minute is recommended as the standard operating speed for vitrified and silicate straight wheels, tapered wheels and shapes other than those known as cup and cylinder wheels.

A peripheral speed of 4,500 feet per minute is recommended as the standard operating speed for vitrified and silicate wheels of the cup and cylinder shape.

In general practice rubber wheels are operated at approximately 8,000 peripheral feet per minute, although for certain operations a higher speed is desirable, but for elastic, rubber and wheels of other organic bonds, the recommendations of individual manufacturers should be followed.

It is necessary to keep the surface speed constant so far as it is practicable.

Mounting of Grinding Wheels.

Always tap a wheel lightly to make sure from the tone of the ring that it is not damaged, never under any circumstances mount an imperfect wheel.

Flanges at least one-half the diameter of the wheel should be used, but never less than one-third. The face of each flange which is next to the wheel should be slightly recessed, and the inside flange should be keyed, or pressed on the shaft, never loose.

Compressible washers of pulp or rubber, slightly larger than the flanges, should be used between the wheel and flanges. They distribute the pressure evenly when the flanges are tightened by taking up any imperfections in the wheel or flange.

The holes in the wheels should be bushed from 2|1,000-inch to 5|1,000-inch larger than the standard size of spindle, this permits the wheel to slide on easily without cramping or being loose.

Tighten flanges only enough to hold wheels firmly, avoiding any unnecessary strain.

Protection hoods should be used wherever possible, but when used without, not over 2 inches radius of the wheel should project outside of the flange.

General Suggestions.

Do not continue to use a wheel that does not give entire satisfaction, but advise us of the difficulty, we can offer expert advice.

If a wheel glazes it is an indication that it is too hard for the work or speeded too high.

Keep wheels true. Frequent truing will prolong the life of wheels as well as increase production. Dressing is not truing, but sharpening the wheel. Excessive dressing wears wheels faster than grinding. If too much dressing is required, it is an indication that the wheel is too hard for the work, or that it is speeded too high.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Bulldog" Grinding Wheels and Abrasives.

By the British Abrasive Wheel Co., Ltd.

When ordering Grinding Wheels please state:—

1. Diameter of Wheel.
2. Thickness.
3. Bore.
4. Grain.
5. Grade.
6. Shape (if unusual send tracing)
7. Class of Machine.
8. Whether wheel is used wet or dry
9. Description of work.
10. Class of material to be ground; whether hard or soft steel, cast-iron, brass or bronze, etc

Corundum, Krysilide (Carborundum).

Made by Vitrified or Silicate Process.

Price List —Plain Corundum Wheels.

Diam. of Wheel Inches.	Thickness of Wheel in Inches.											
	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	3	3½
	Rs A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A	Rs. A.	Rs. A
1	1 0	1 2	1 4	1 8	1 12	..	..	..	..	..	..	..
1½	1 2	1 4	1 6	1 10	1 14	2 2	2 6	..	..	..	.	..
2	1 6	1 8	1 12	2 0	2 6	2 10	3 0	3 6	3 12	.	..	..
2½	1 8	1 12	2 0	2 4	2 12	3 2	3 6	3 12	4 2	4 14	..	..
3	1 12	1 14	2 2	2 8	3 2	3 6	4 0	4 6	4 12	5 8	6 8	
3½	1 14	2 2	2 4	2 14	3 8	4 0	4 6	4 12	5 2	6 4	6 14	8 0
4	2 4	2 8	2 14	3 6	4 2	4 10	5 2	5 10	6 8	7 8	8 10	9 12
4½	2 12	3 0	3 8	4 0	4 12	5 8	6 0	6 12	7 8	8 12	10 4	11 8
5	3 2	3 8	4 0	4 8	5 8	6 4	6 14	7 12	8 8	10 0	11 12	13 0
6	4 0	4 8	4 14	6 0	6 14	8 0	9 0	10 0	10 14	13 0	15 4	17 8
7	4 12	5 8	6 0	7 4	8 12	10 0	11 8	12 12	14 0	16 12	19 8	22 4
8	5 12	6 8	7 2	9 0	10 8	12 8	14 0	15 12	17 4	21 0	24 8	27 12
9	6 8	7 8	8 8	10 8	12 8	14 8	17 0	19 8	21 12	26 0	30 4	36 0
10	7 4	8 12	10 0	12 8	15 4	17 12	20 8	23 12	26 8	32 8	38 8	44 0
12	9 8	10 8	12 8	15 12	19 8	23 4	26 8	30 4	33 8	41 8	49 8	58 0
14	..	..	14 0	18 8	23 0	27 8	32 0	37 0	41 0	50 8	60 0	70 0
16	..	..	..	32 8	30 0	35 8	42 0	47 8	53 8	65 8	77 0	90 0
18	..	..	..	..	36 8	44 8	52 0	59 0	67 0	81 0	95 0	110 0
20	..	..	..	..	..	54 8	63 0	72 0	81 0	97 8	115 0	142 0
22	..	..	..	..	..	67 0	77 8	88 0	99 0	120 0	140 0	162 0
24	..	..	..	..	..	79 8	92 0	105 0	117 0	142 8	168 0	194 0

The above prices are all subject to the usual allowance for holes 6 ins. dia. and over.

Prices for Krysilide (Carborundum) wheels 25% extra.

Corundum Wheels are used for grinding such as Soft Steel, Steel Castings, Drop Forgings, etc.

Krysilide (Carborundum) Wheels are used for grinding materials of low tensile strength such as Cast-iron, Chilled-iron, Brass, Bronze, Copper, Aluminium, etc.

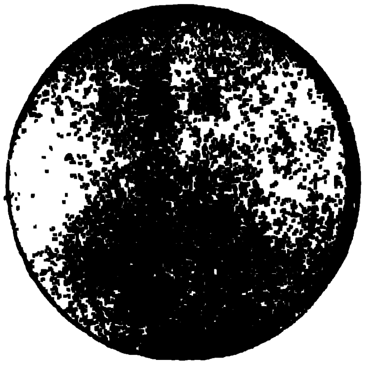
Electrundum Wheels are used for grinding materials of high tensile strength such as Steel, Malleable Iron, etc.

Prices for Taper, Cup, Cylinder, Vulcanite or Rubber, Elastic and Special Wheels for the various makes of Grinding Machines on application.

Grinding Wheels and Abrasives.

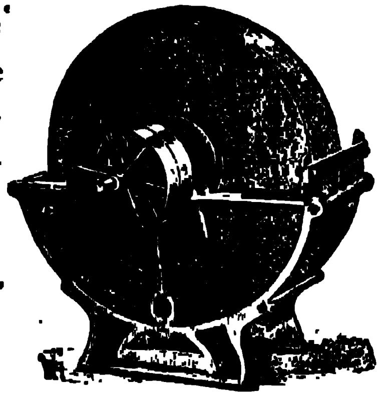
Grindstones.

Best Newcastle.



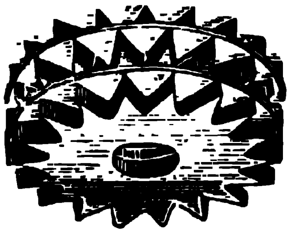
These best quality Newcastle Grindstones are obtained from the best English firms of Grindstone Quarry owners, and hence their quality can be guaranteed as genuine.

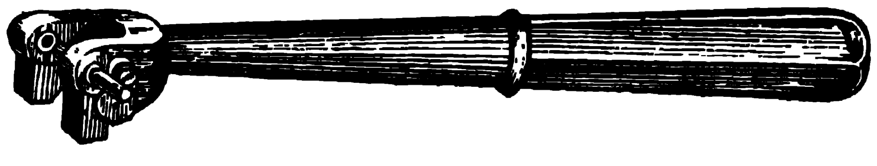
They are suitable for Carpenters, Joiners, Engineers, or any one requiring a fine cutting edge.



Diameter	ins.	24	30	36	48
Thickness	„	4	5	6	8
Plain Grindstones	Rs.	19 8	36 0	60 0	150 0
In M.S. Trough for Hand Power	„	140 0	200 0	220 0	400 0
„ „ „ „ Power Drive, Single Pulley	„	170 0	220 0	260 0	480 0
„ „ „ „ „ with Fast and Loose Pulley	„	190 0	260 0	300 0	560 0

Huntingdon " Emery Wheel Dressing Tool.





Price, Rs. 3-0 each, with two sets of cutters.

Diamond Dressing Tool for Turning Abrasive Wheels		Rs.	90-0 each.
Emery Cloth, Nos. 0 and 1	per doz.	„	2-2
„ „ „ 2 ..	„	„	2-8
Emery Powder „ 1, 1½ and 3	per lb.	„	0-6
„ **Flour** „		„	0-4
Carborundum Powder, medium		„	2-2
„ „ fine	„	„	4-0
Glass Paper Nos. 1 and 1½	per doz.	„	1-0
„ „ „ M2		„	1-4
„ 3			1-6
Cloth 1 and 1½			1-12
M2			2-2
3			2-4

Foundry Requisites.

Salamander Crucibles.

These Crucibles are uniform in quality. They withstand the greatest heat without danger. The average durability for Gold, Silver, Copper and other ordinary metals is forty to fifty pourings; in some cases over one hundred have been obtained. They never crack and heat more rapidly than any other kind. One annealing only is required Change of temperature has no effect. They can, when hot from the furnace, be dipped in cold water with safety.

Made in sizes varying from 2 ozs to any required capacity, and marked by the number of kilogrammes they will contain, a kilogramme being equal to about 2 lbs.

Thus, No. 5 will contain 10 lbs ; No. 25, 50 lbs ; No. 50, 100 lbs ; No. 100, 200 lbs.; and so on

Prices. Sizes up to No. 6 **As. 8** per number.
„ Over No 6 and under No 20 **As. 7-6** per number.
„ No 20 and over **As. 6-6** per number.

Morgan's Plumbago.

This Powder is superior to Blacking for Iron Casting, is more readily slaked [illegible] the moulds, and doe not fire; thus a fine, smooth, clean surface is given to the castings. When used for blacking cores it is mos efficient, allowing the core to leave the castings more readily than ordinarily, thus effecting a great saving i time and labour.

No. 9062.	For Green Sand Castings	**Rs. 37-8** per cwt.
„ 7420.	„ Dry „ „	„ **42-0** „

Steel Ladles for Foundry use.

Very strong and durable.

Size	.. No.	1	2		4
Capacity	cwts.	½	¾		4
Price, each	**Rs.**	**16 0**	**24 0**	**63 0**	**124 0**

Moulders' Blacking	.. **Rs. 18-12** per cwt
„ **Tools**	**Prices on Application**
Fire Clay ..	.. **Rs. 44-0** per ton
„ **Bricks** ..	.. „ **17-8** „ 100.

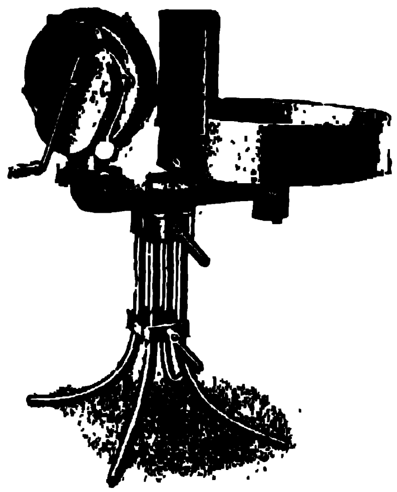
Pyruma Fire Cement.

For the Cupola, etc.

Pyruma Fire Cement sets hard, holds fast, and resists very high temperatures. No 1 grade, coarse, will withstand under ordinary conditions a temperature of approximately 1,800°C (3,272°F). It greatly improves fireclay when mixed with the latter and can be used in combination with other minerals of a fibrous or clayey nature and for many other purposes.

In 1 cwt. Kegs **Rs. 28-0** per cwt.

Bellows and Forges.



Hand Geared Fan Forges.

British made throughout.

This Forge is specially adapted for heating rivets, but will also be found most serviceable for all manner of outdoor work.

It is an easy rapid heater, of large capacity, and is as light as is consistent with strength. For transportation the parts may be easily detached and packed in small compass. The gearing is enclosed in a small dust-proof case. Its action is smooth, easy and noiseless. The material and workmanship throughout is of the best.

Diam. of Hearth.	Diam. of Fan Case.	Nett Weight.	Price,
20 ins.	9½ ins.	100 lbs.	**Rs. 100**

The Champion Geared Forges.

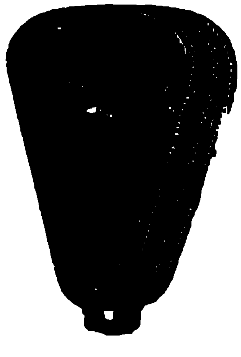
The Champion Forge is equipped with a cut-geared crank-driven blower, helical gearing being used to give smooth running and noiseless operation. The gear ratio gives 48 revolutions of the blast wheel to one turn of the crank, making a strong, steady, high-pressure, blast with smooth easy turning—crank turning either direction. The gear case is oil-tight and dust-proof, making them very satisfactory forges for general light and medium work, such as Garages, Farmers or any place where a light portable forge is desired.

Diameter of Hearth.	Diameter of Fan Case.	Nett Weight.	Price, Rs.
18 ins.	8 ins.	72 lbs.	**64-0**

Smith's Bellows.

Extra strong with Galvanized Nails and patent Reversible Pipes. By reversing pipe and packing gudgeons and lifting hooks securely inside the packing area of the bellow is reduced by one-half.

Width	ins.	24	30	36
Length	„	37	49	62
Price	**Rs.**	**84**	**130**	**215**



Moulders' Hand Bellows, 14 ins. by 10 ins. .. .. **Rs. 14** each

New Pattern Smith's Hearths.

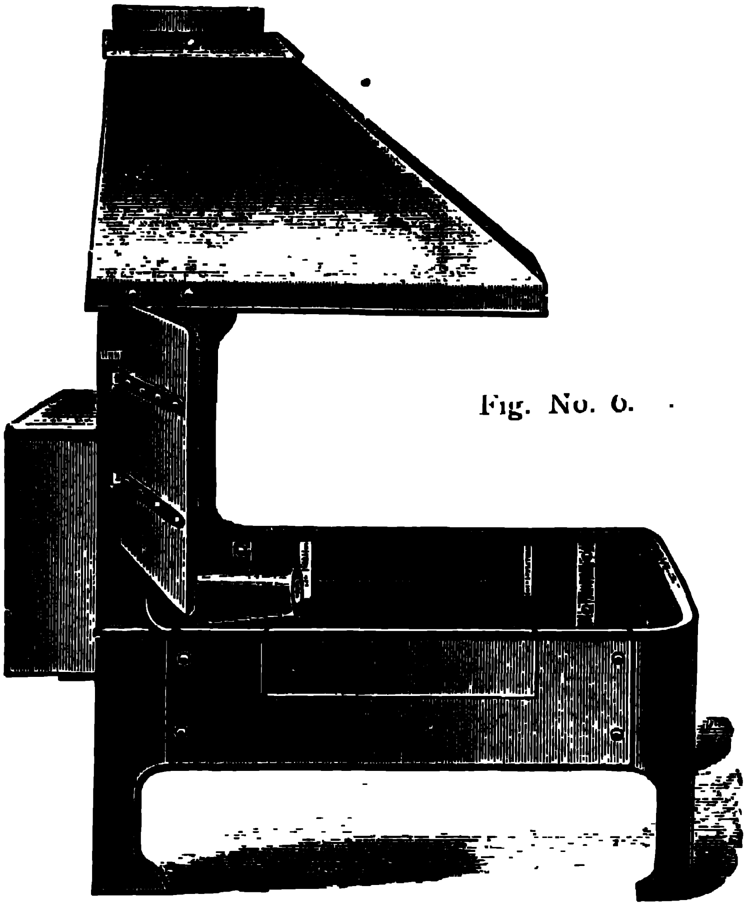


Fig. No. 6.

This special design of Hood can be made in either Wrought or Cast-Iron to suit constituents.

The design gives the flame and smoke free exit, and is therefore not so hot to work at as the ordinary pattern of Hoods.

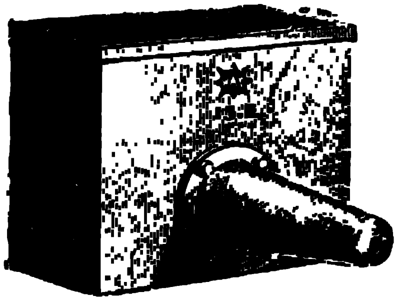
The Hearth and Hood are so made, that they can be taken down and packed in cases of small dimensions. It is fitted with Cast-Iron Water Tue-Iron and Cistern and Breast-plate.

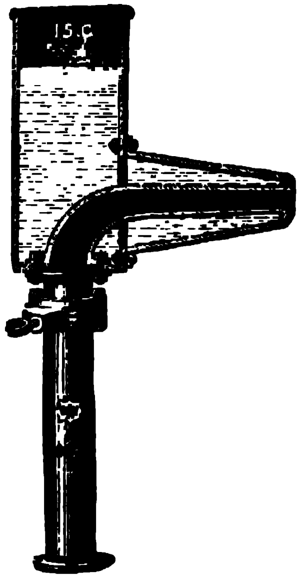
This Hearth is strongly recommended for contractors' work.

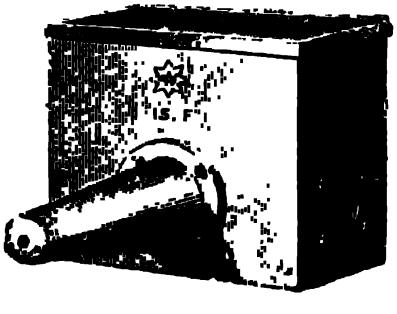
A	6' × 3' × 3'	..	Rs. 385
B	6' × 3½' × 3½'	..	„ 430
C	6' × 4' × 4'	.	„ 490
D	6' × 4½' × 4½'	..	„ 540

Coal and Water Trough extra.

Improved Water Boshes and Tue-Irons.



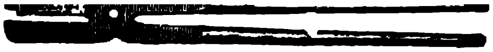




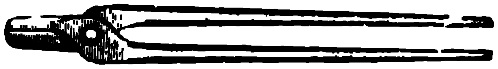
Prices on application.

Smith's Tools.

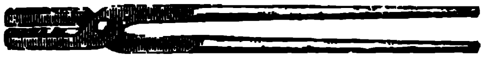
1. HOLLOW BIT TONGS.



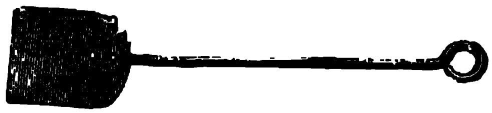
2. CLOSED MOUTH TONGS.



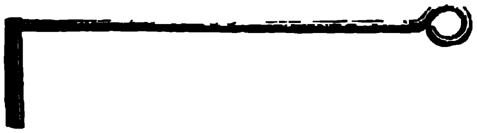
3. OPEN MOUTH TONGS.



4. SHOVEL.

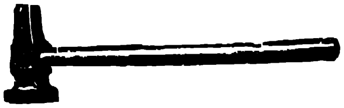


5. RAKE.

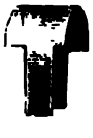


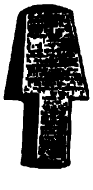
6. POKER.

7. SET HAMMER.



8. C.-S. HARDIE FOR ANVIL.



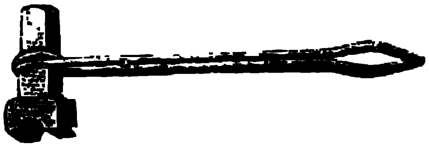


Prices of Tools.

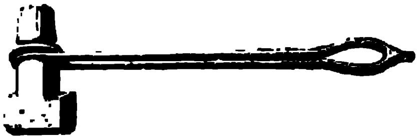
Nos. 1 to 6 .. .. As. 12 per lb.

„ 7 „ 16 .. .. Rs. 1-8 „ „

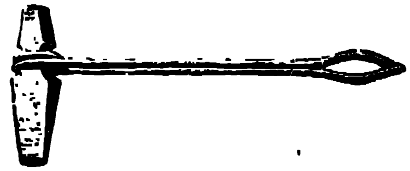
9 & 10. TOP AND BOTTOM SWAGE.



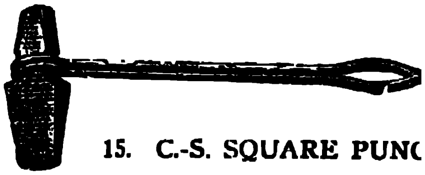
11 & 12. TOP AND BOTTOM FULLER.



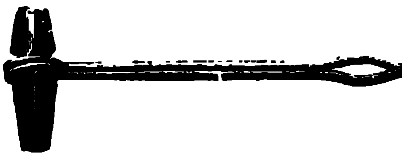
13. C.-S. HOT SET.



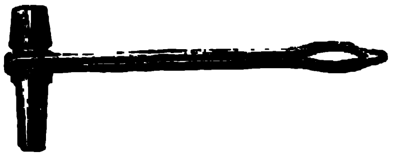
14. C.-S. COLD SET.



15. C.-S. SQUARE PUNC



16. C.-S. ROUND PUNCH.



SWAGE BLOCKS.

Price, per cwt. Rs. 26-0.

Sets of Smith's Tools.

No. 1.

	Nos.
3 Each Top and Bottom Swages ..	9 & 10
3 „ Steel Flatteners	7
1 „ Sets and Punches	13, 14 & 16
3 Pairs Tongs ..	1, 2 & 3
2 Sledge Hammers	
1 Set Firing Tools ..	4, 5 & 6
1 Hand Hammer	

Rs. 110-0 per set.

No. 2.

	Nos.
6 Each Top and Bottom Swages ..	9 & 10
4 Steel Flatteners ..	7
1 Each Sets and Punches	13 to 16
6 Pairs Tongs ..	1, 2 & 3
2 Sledge Hammers	
1 Set Firing Tools ..	4, 5 & 6
1 Hand Hammer	

Rs. 180-0 per set.

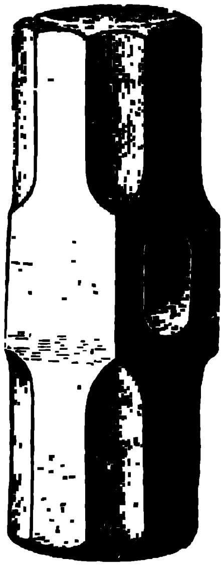
No. 3.

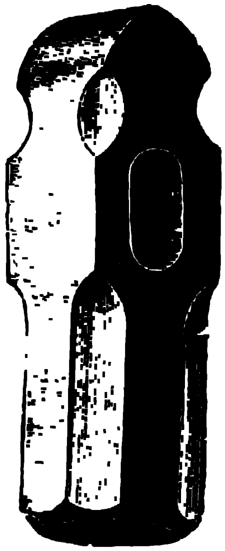
	Nos.
9 Each Top and Bottom Swages ..	9 & 10
3 „ „ Fuller ..	11 & 12
2 C.-S. Hot Sets	13
2 „ Cold „	14
2 Each Punches	15 & 16
2 Sledge Hammers	
9 Pairs Tongs	1, 2 & 3
1 Hand Hammer	
1 Anvil ..	
1 Swage Block	

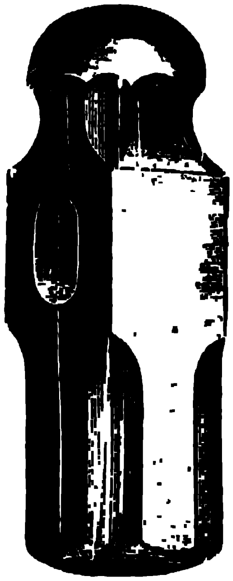
Rs. 370-0 per set.

Hammers.

Solid Steel Sledge Hammers.

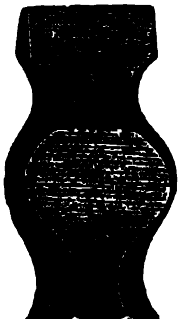

Double Faced

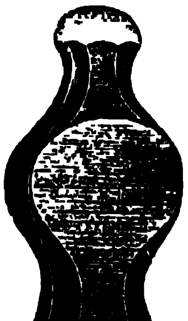

Straight Pane.


Ball Pane.

Price, 3, 4, 6, 7, 10 and 14 lbs., **As. 6** per lb.

Engineers' Solid Steel Hammers.

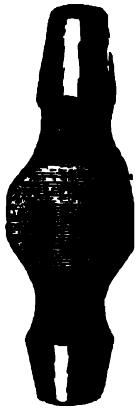

Cross Pane.


Ball Pane.

1 to 2 lbs.

Price, As. 10 per lb.

Solid Steel Riveters' and Boiler-makers' Hammers.



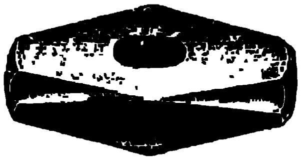
1 to 3 lbs.

Price, As. 12 per lb.

Hammer Handles. Best Hickory.

Size .. .. .. ins.	14	16	18	22	24	30	36
Price, per dozen .. .. .. **Rs.**	**3 0**	**3 6**	**3 8**	**4 8**	**5 0**	**7 8**	**9 12**

Hammers and Chisels.



Miners' Hammers.

Price, 7 lbs. **As. 6** per lb.

Quarry Hammers.

Solid Steel. All patterns. 5 lbs. and over.
Price, **As. 7** per lb.

Spiking Hammers.

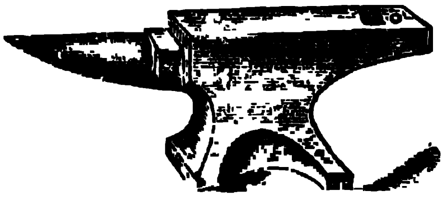
Price, 7 lbs. **Rs. 42** per cwt.

Keying Hammers.

Solid Steel. 5 lbs. and 9 lbs.
Price, Rs. 42 per cwt.

Stone Breakers' Hammers.

Price, 1½ lbs.	**Rs. 70-0** per cwt.
„ 2 „	„ **70-0** „ „



Anvils.

Sizes.	per cwt.
1½ to 5 cwt. advancing by ½ cwt. ..	**Rs. 44-0**

Cast-Steel Chipping Chisels.

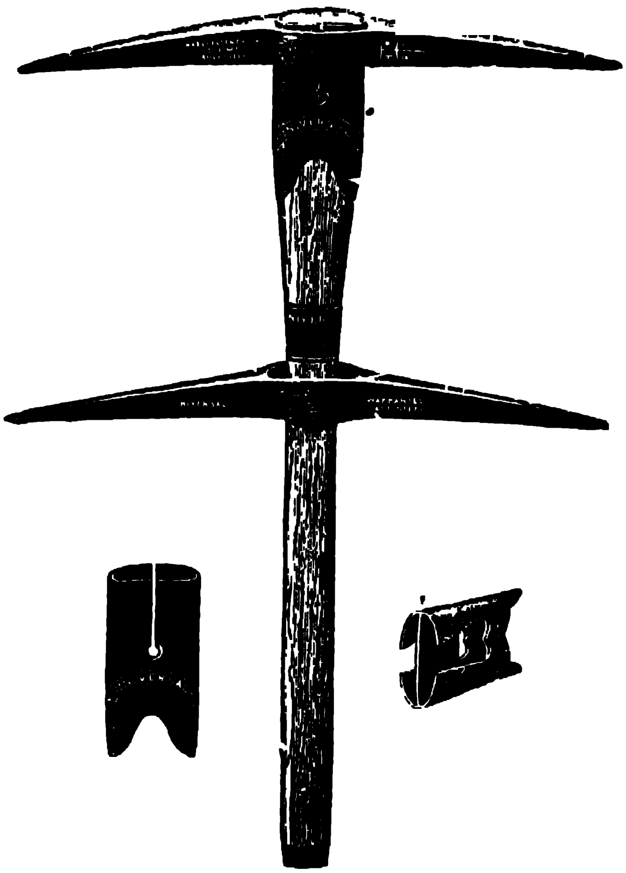
Flat, Cross-cut, Half-round, Diamond Point.

Size, 6 ins by ½ in.	**As. 7** each.
„ 6 „ „ ⅝ „	„ [illegible] „

Also made to order from Edgar Allen's Cast-Steel.

Dolphin Brand	**Rs. 1-6** per lb.	Class F	**Rs. 1-8** per lb.

Miners' "Universal" Solid Steel Picks.



These Picks are all steel, and the hold of the handle is made to gauge so that any handle will fit the Picks, and they can be changed in a few seconds.

The handles or shafts are shod at both ends, at one end with a narrow band or ferrule, whose function is merely to prevent the tip of the handle spreading or fraying, and at the other end with a long tapered socket made of malleable iron or spring steel of special quality, on to which the Pick fits.

Prices.

3½ lbs. "Universal"	..	Rs. 20-4 per doz.
4 „ „	..	„ 22-0 „

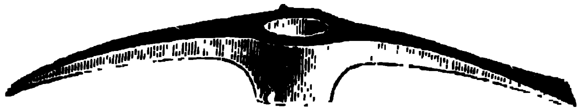
"Universal" Pick Handles.

30 inches long.

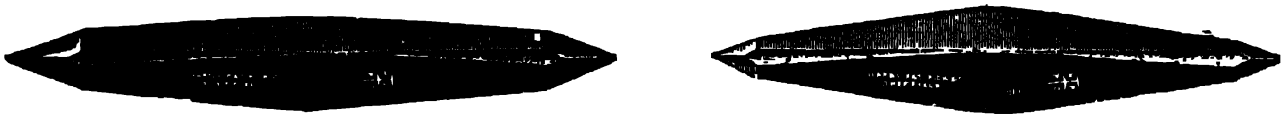
Complete with Ferrules and Sockets	Price, Rs.	25-0 per doz.
Do. without Sockets	„	12-8
Sockets only „	„	12-0

Pick Axes.

Weight 6½ lbs. **Price, Rs. 27-0** per doz.



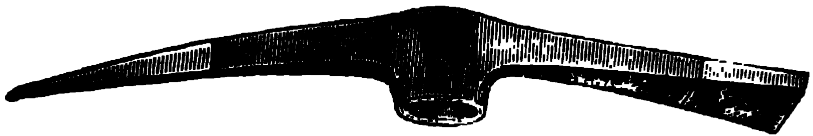
Solid Steel Quarry Picks.



6½ lbs. Double Pointed.	Price, Rs.	36-0 per doz.
7 „ „ „	„ „	38-0 „

Railway Beaters.

Patent Solid Eye. All-Steel.



Weight 7 lbs.	Price, Rs.	30-0 doz
„ 10 „	„ „	38-0 „

Crow Bars and Jumpers.

All-Steel Crow Bars Steel End „	Price, Rs. 63-0 cwt.

Shovels, Etc.

Square Mouth Shovel.

Size, 13 ins. by 10½ ins.	Rs. 18-14 per doz.
„ 13½ ins. by 11 ins.	„ 20-12 „ „

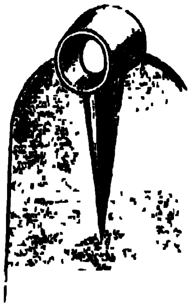
Round Mouth Shovel.

Size, 13½ ins. by 11½ ins.
Rs. 18-8 per doz.

Loco Stoking Shovel.

All-Steel.

Size, 15¼ ins. by 9 ins.	**Rs. 38-0** per doz.
„ 16 ins. by 8½ ins.	„ **36-0** „ „
„ 18 ins. by 9 ins.	„ **40-0** „ „
„ 19 ins. by 9 ins.	**44-0**

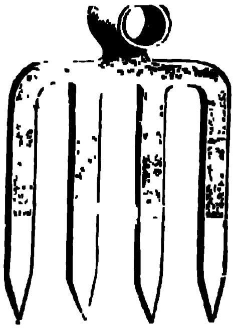


Cast-Steel Ballast Rakes.

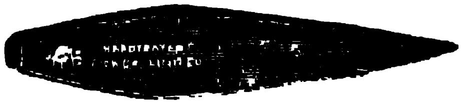
4 Prongs 5¼ lbs. **Price, Rs. 4-6 each.**

Kodalies.

	Width.	Length.
Size, No. 4 by 4 lbs.	8½ ins.	11 ins.
	Price, Rs. 21-0 per doz.	
	Width.	Length.
Size, No. 6 by 4½ lbs	8½ ins.	11½ ins.
	Price, Rs. 24-0 per doz.	

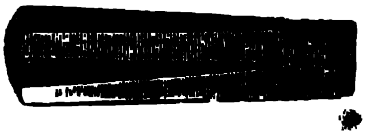


Miners' Wedges.



All Sizes to order.
Ordinary stock. Size, 9 lbs.
Price, As. 6 per lb.

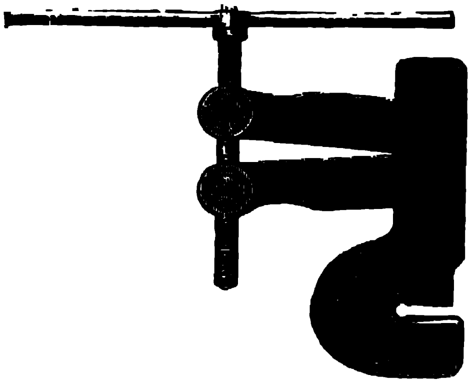
Wood Splitting Wedges.



All Sizes to order.
Price, As. 6 per lb.

Duplex Lever Punching Bear.

This Bear has forged steel body, levers and ram; steel joint pins; steel screw and gun-metal nuts; wrought-iron handle and washers; one round steel punch and die. Each Bear is tested before leaving the Works.



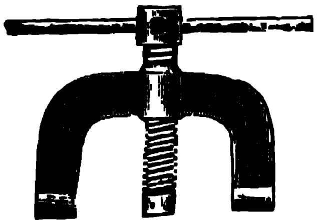
Size .. .. No.	1	2	2a	3	4
Steel Plates					
To punch holes, diameter in.	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$
Through plates, thick „	$\frac{5}{32}$	$\frac{1}{4}$	$\frac{11}{32}$	$\frac{13}{32}$	$\frac{13}{32}$
Iron Plates					
To punch holes, diameter in.	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$
Through plates, thick „	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{8}$
Gap .. .. ins.	$1\frac{1}{8}$	$1\frac{1}{2}$	2	2	$2\frac{1}{4}$
Approx. weight .. lbs.	18	39	68	84	132
Price .. .. **Rs.**	**98-0**	**138-0**	**182-0**	**215-0**	**330-0**
*Steel Punches and Dies extra per pair round **Rs.**	**8-0**	**10-0**	**11-0**	**12-0**	**13-0**

*A pair means one punch and one die.

Jim Crows.

Screw Rail Benders.

With Machine-cut square thread, and body made of best mild Steel.

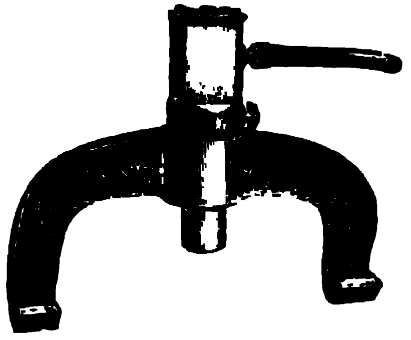


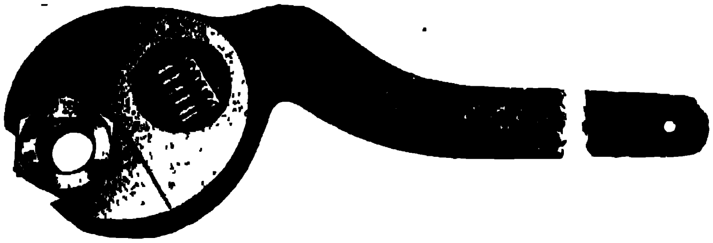
Size . No.	0	1	1a	2	3	3a	4 •	5	6
To Bend Iron Rails, Ordinary Sections, up to lbs per yd.	24	30	45	55	75	85	100	110	..
Do Steel do. lbs. per yd.	16	20	30	45	65	73	90	100	110
Span Inside Claws ins.	14	16	18	20	24	25	24	27	27
Diameter of Screw ins.	$1\frac{3}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{3}{4}$	3	$3\frac{1}{8}$
Approximate Weight lbs.	45	70	85	105	140	165	190	230	245
Price, each Rs.	**45**	**53**	**66**	**78**	**105**	**126**	**150**	**200**	**200**

Hydraulic Rail Bender.

Frame of best Mild Steel, Gun-metal Pump and Plunger, Wrought-Iron Hand lever, malleable Cast-Iron Pump Wrench.

Size .. .. .. **No.**	1	2	2a	3	4
To Bend Iron Rails, Ordinary Sections, up to .. lbs. per yd.	55	75	85	100	110
Do. Steel do. „ „ „	45	65	75	90	100
Span Inside Claws .. .. ins.	20	24	24	24	27
Approximate Weight .. lbs.	105	165	200	220	260
Price, each .. .. Rs.	**130**	**180**	**215**	**220**	**550**





Clyburn "Patent Strong Jaw" Spanners.

Length ..	ins.	6	8	10	12	14	16	18	21	28	30
Span of Jaw	"	⅝	¾	1	1¼	1⅛	1⅝	1¾	2	2¾	3
Weight	lbs.	½	¾	1 3/16	2	2 3/16	3 3/16	3⅝	5½	12	13½
Price, each	**Rs.**	**4-0**	**4-12**	**5-14**	**7-6**	**7-12**	**9-4**	**12-8**	**15-8**	**32-0**	**40-0**

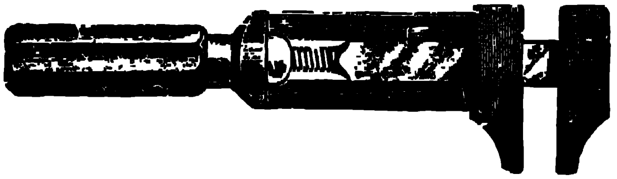
Drop-Forged Wrought-Steel Double-Ended Spanners.

Heads inclined at an angle of 45 degrees.

Size of Whitworth Nuts.	Width in Jaws.	Width in Jaws. Millimetres.	Length.	Price, each, machined and hardened.	
ins.	ins.	ins.	ins.	**Rs.**	**As.**
¼×⅜	17/32×23/32	13×18	6¾	**0**	**8**
5/16×7/16	19/32×13/16	15×20	7¾	**0**	**12**
⅜×½	23/32×15/16	18×23	9¼	**0**	**14**
½×⅝	15/16×1⅛	23×28	11	**1**	**0**
⅝×¾	1⅛×1 5/16	28×33	13	**1**	**4**
¾×⅞	1 5/16×1½	33×38	14½	**1**	**10**
¾×1	1 5/16×1 11/16	33×43	15½	**2**	**4**
⅞×1	1½×1 11/16	38×43	16½	**2**	**8**
1 ×1⅛	1 11/16×1⅞	43×47	18	**3**	**2**
1⅛×1¼	1⅞×2 1/16	47×52	19	**4**	**0**
1¼×1⅜	2 1/16×2¼	52×57	20½	**6**	**0**
1¼×1½	2 1/16×2 7/16	52×62	21	**6**	**4**
1⅜×1½	2¼×2 7/16	57×62	22	**6**	**8**
1½×1¾	2 7/16×2¾	62×70	26	**10**	**0**
1¾×2	2¾×3 3/16	70×81	30	**15**	**12**

Single-Ended, Box and Crow Foot Spanners. Prices on application.

Coach or Screw Wrenches.

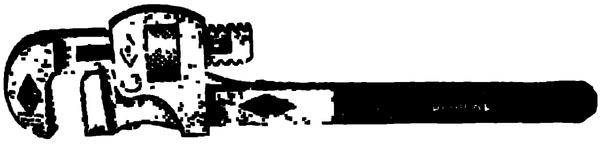


Double Pillar.

Length open in ins.		6	8	10	12	14	16	18
To span	ins.	1¼	1½	2	2¼	3	3½	4
Price, each	**Rs.**	**8-8**	**9-8**	**10-8**	**12-0**	**18-4**	**22-0**	**27-0**

Stillson's Patent Pipe Wrenches.

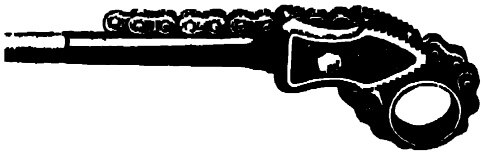
All-Steel.



Length open in ins.	6	8	10	14	18	24	36	48
Takes from	⅛ in. wire to ½ in. pipe.	⅛ in. wire to ¾ in. pipe.	⅛ in. wire to 1¼ ins. pipe.	¼ in. wire to 1¾ ins pipe.	¼ in. wire to 2½ ins. pipe.	¼ in. wire to 3 ins. pipe	¼ in. wire to 4 ins. pipe.	1 in. pipe to 5 ins. pipe.
Price, each Rs.	**4-8**	**5-0**	**5-8**	**7-8**	**11-8**	**15-12**	**19-8**	**44-0**

Chain Pipe Wrench.

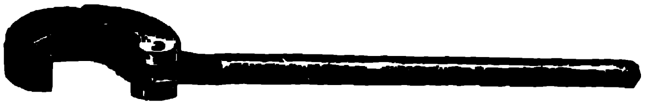
With Double-Ended Reversible Jaw and Flat Link Chain.



For gripping, turning, or holding pipes, bolts, bars, shafts, etc., from ⅛ in. to 12 ins. diameter. These wrenches combine the merits of all chain pipe wrenches with special advantages of their own. They are strong and durable, being made from wrought-steel. The pressure of the teeth is in a line tangent to the circumference of the pipe, and this, combined with the encircling grip of the chain, prevents crushing. The flat link chains are hand-made from steel prepared expressly for them, and carefully tested. All parts are interchangeable.

Number.		10	11	12	13	13½	14	15
Capacity, Size of Pipe	ins.	⅛ to ¼	⅛ to 1½	¼ to 3	½ to 4	¾ to 6	1 to 8	2 to 12
Length overall	„	14	20	27	37	44½	50½	64½
Weight	lbs.	2⅝	5¾	10	16	24	31	50
Price, each	**Rs.**	**9-8**	**13-8**	**19-8**	**26-8**	**34-0**	**41-8**	**68-0**

Self-Adjusting Pipe Wrench.

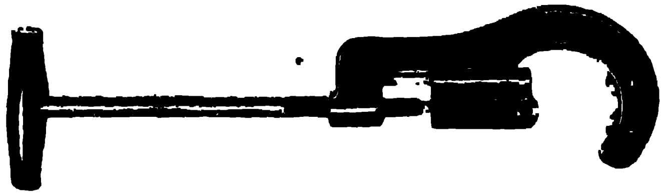


Malleable-Iron Head, Wrought-Iron and Hardened Steel Grip.

Size	No.	2	3	4	5	6
To Grip	ins.	¼ to 1	½ to 1¼	1 to 2	1¼ to 2¼	1½ to 3
Price, each ..	**Rs.**	**8-0**	**10-8**	**16-0**	**19-8**	**28-0**

Virax Three-Wheel Tube Cutter.

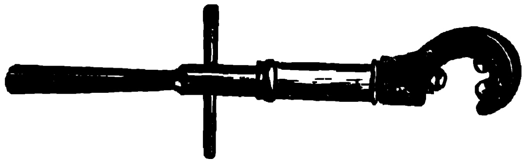
Barnes' Pattern.



The cutter wheels and pins of these pipe cutters are interchangeable with those of the American standard makes of "Barnes'" pipe cutters.

The wheels made from the very best Sheffield cast-steel are guaranteed.

		1	2	3	4
Size	No.	1	2	3	4
For Tubes	ins.	⅛ to 1	½ to 2	1½ to 3	2½ to 4
Price, each . .	**Rs.**	9-0	13 8	20-8	33-8
Spare Cutter Wheels, each .	**Rs**	0-12	0-15	1-4	1 13



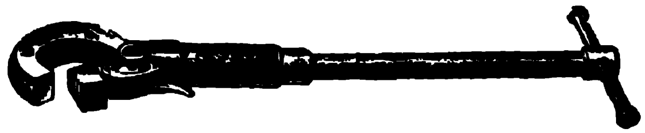
Three-Wheel Tube Cutter.

Size . .	No.	1	2	3	4
For Tubes . .	ins.	¼ to 1	1 to 2	1¼ to 3	2¼ to 4
Price, each	**Rs.**	20-0	28-0	36-0	45-0
Spare Cutter Wheels, each ..	**Rs.**	1-0	1-0	1-2	1-2

Tube Cutter and Pipe Wrench.

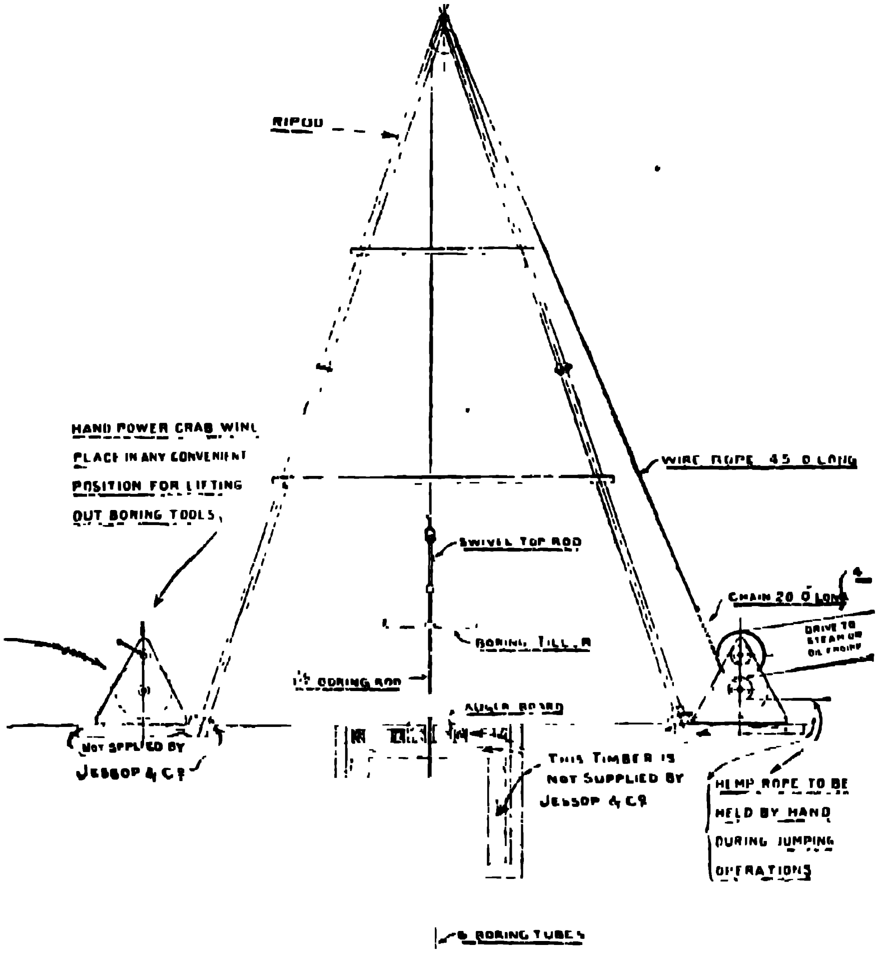
Combined.

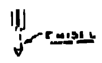
Gripping Surface Carefully Hardened.



Size	No.	1	2	3
For Tubes	ins.	¼ to 1	1¼ to 2	2¼ to 3½
Price, each	**Rs.**	17-8	27-12	38-8
Spare Cutters, each	**Rs.**	1-0	1-2	1-2

Tripods for Boring Plant.


TRIPOD
HAND POWER CRAB WINCH PLACE IN ANY CONVENIENT POSITION FOR LIFTING OUT BORING TOOLS
NOT SUPPLIED BY JESSOP & Co.
WIRE ROPE 45 0 LONG
SWIVEL TOP ROD
CHAIN 20 0 LONG
DRIVE TO STEAM OR OIL ENGINE
BORING TILLER
1½" BORING ROD
AUGER BOARD
THIS TIMBER IS NOT SUPPLIED BY JESSOP & Co.
HEMP ROPE TO BE HELD BY HAND DURING JUMPING OPERATIONS
6" BORING TUBES



Wrought-Iron Tubular or Wooden Tripods constructed to suit constituents' requirements.

Prices on application.

Notes on Working Boring Plants.

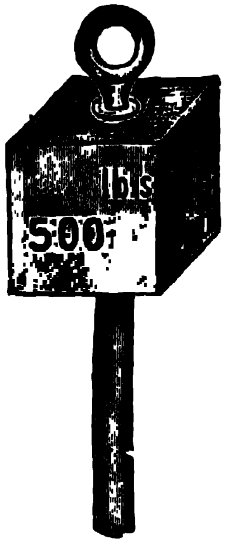
Wherever possible it is advisable to sink a shaft of suitable diameter, and put the boring stage about 6 feet below the level of the surface. This shaft will be found particularly useful when driving the lining tubes as it allows the rods to be disconnected in 20 feet lengths instead of 10 feet, and thus saving a good deal of time.

The place for sinking having been chosen, a truly vertical hole is made in the ground, and in this the properly rigged tube is inserted: the tripod being erected directly over the appointed position.

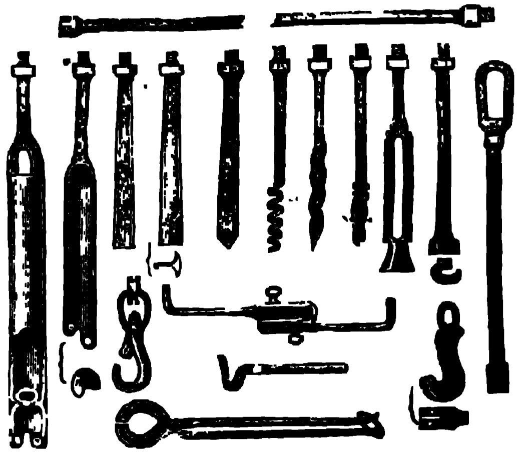
The tubes are then driven in with a driving monkey, care being taken to see the tubes maintain a vertical position, follow a straight course, and the Driving Caps are tightened after every few blows.

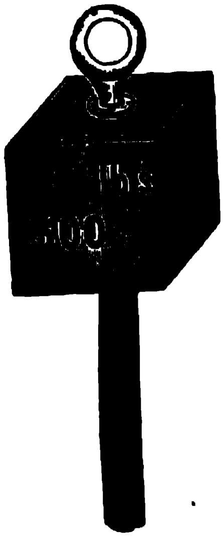
Sufficient tubes must be first driven in until they reach the strata which will hold them steady; then would commence the boring and continue as far as possible before driving more tubes.

Boring Tools, Etc.



DRIVING MONKEY





DRIVING MONKEY

Prices of Boring Tools and Accessories.

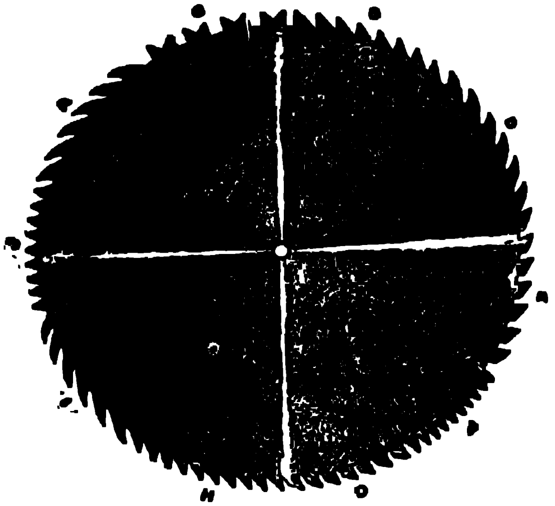
Tool.	Prices for tubes.					
	3"		4"		5"	
	Rs.	A.	Rs.	A.	Rs.	A.
Clay Auger (for clay or stiff earth)	45	0	50	0	55	0
Auger Nose Shell, with valve for saturated soils	60	0	80	0	100	0
Water Shell, Sand or Sludge Pump ..	60		80	0	100	0
Plunger Sand Pump ..	60		80	0	100	0
Flat Chisel for soft rocks	23		26		30	0
T Chisel for harder rocks	33		36		40	0
Cross Chisel for harder rock	40		30		60	0
V Cross Chisel for moderate rocks ..	23	0	26		30	0
Circular Chisel for trimming holes ..	45	0	50		55	0
Spring Chisel for enlarging holes below pipes ..	55	0	75		95	0
Pipe Clamps for casing tubes	25		30		35	0
Pipe Tillers	25		30		35	0
Ironwork for wooden shear pegs	85		85		85	0
Spring Hook (see above)	60		60		60	0
Hand Dog or Rod Wrench .. (see above)	15		15		15	0
Rod lifting Dogs (see above)	30		30		30	0
Spiral Worm for drawing broken rods (see above)	40		45		50	0

Tool.	Prices for tubes.					
			4"		5"	
	Rs.	A.	Rs.	A.	Rs.	A.
Spring Dart for drawing out pipes	50	0	55	0	60	0
Worm Auger for loosening material in bore hole	45	0	50	0	55	0
Crows Foot for withdrawing broken rods and tools .. (see above)	30	0	30	0	30	0
Square Boring Rods with screwed ends (length 10 ft. each)	30	0	30	0	30	0
Swivel Top Rod ..	45	0	45	0	45	0
Bell box for extracting broken rods and tools (see above)	55	0	65	0	75	0
Bell Screw .. („ „)	30	0	30	0	30	0
Steel driving Shoe for casing .. .	20	0	25	0	30	0
Driving Cap for casing ..	35	0	35	0	55	0
Tillers for turning rods ..	30	0	30	0	30	0
Spare Bolts for tillers each	4	0	4	0	4	0
Driving Monkeys 2 cwt. to 5 cwt. per cwt.	14	0	14	0	14	0
Prices of— Screw Jacks, Snatch Blocks, Rope and other tackle to suit borings of stated depth, on application ..	See Page Nos. 25, 26-29, 31, 104-110					
Tripods of wood or iron ..	See Page No. 70					

Saws.

Cast-Steel Circular Saws for Wood.

Machine Ground.



Ripping or Cross-Cut Tooth.

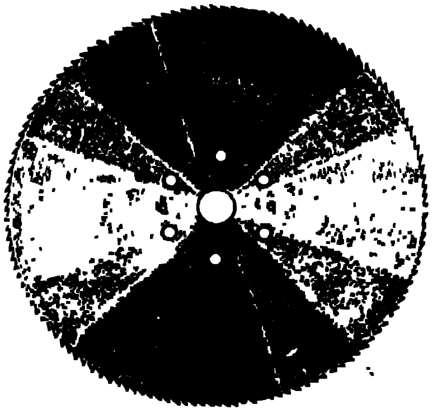
Diameter ..	ins.	16	18	24	26	30	36	42	48	54	60
Thickness ..	B.W.G.	13	13	10	10	9	8	7	7	6	5
Price, each ..	**Rs.**	**13**	**16**	**29**	**33**	**45**	**69**	**102**	**137**	**250**	**360**

In ordering Circular Saws please give the following particulars:—Diameter, diameter of centre hole, and pin hole if any; also distance of pin hole from centre hole, and if for cutting hard or soft wood.

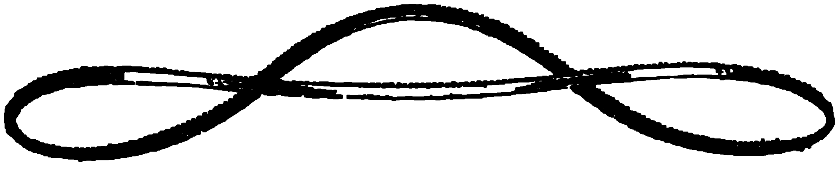
Circular Saws, stronger than the gauge named above can be supplied at an extra cost.

Circular Saws for Cutting Iron or Steel.

Diameter ..	ins.	18	24	30	36	42	48
Thickness ..	B.W.G.	6	5	5/16	5/16	5/16	⅜
For Iron or Steel, Cold **Price, each ..**	**Rs.**	**52**	**84**	**132**	**225**	**315**	**510**
For Iron or Steel, Hot **Price, each ..** ¼" thick.	**Rs.**	..	..	**37-8**	..	..	



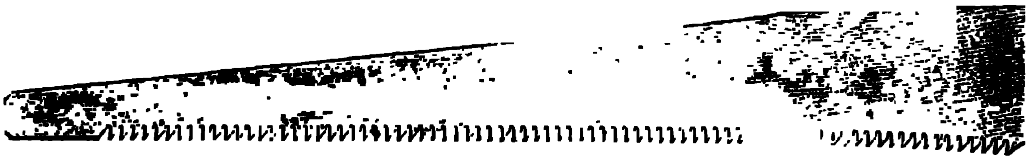
Endless Band Saws.



Width ..	.. ins.	½	⅝	¾	1	1¼	1½
Price, per ft.	.. **Rs.**	**0-8**	**0-9**	**0-12**	**1-0**	**1-8**	**2-0**

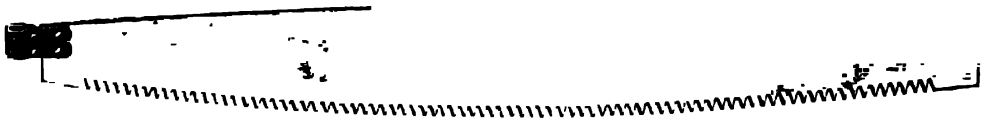
These prices are for 19 Wire Gauge, thicker sizes are charged extra.

Pit Saws.



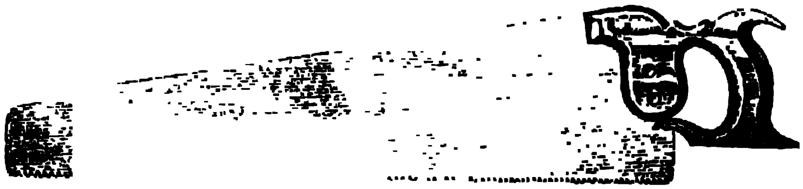
Length .. .. ft.	6	6½	7	7½	8
Price, each .. .. **Rs.**	**12-8**	**14-0**	**16-8**	**21-0**	**27-0**

Cross-Cut Saws.



Length ft.	5½	6	6½	7
Price, each **Rs.**	**10 0**	**12-8**	**14 0**	**16-8**

Taper Hand Saws.

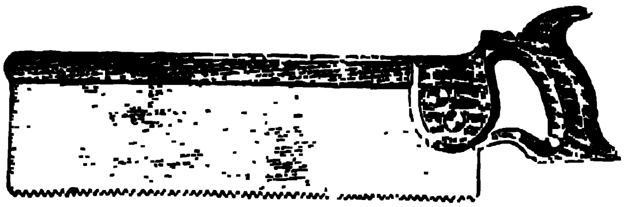


Size ins.	18	24	30	36
Price, each, **Rs.**	**2-12**	**4-0**	**5-0**	**6-4**

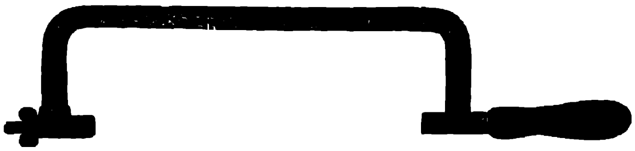
Tenon or Back Saws.

Iron Back.

Size	8	10	12	14	16	18
Price, each, **Rs.**	**4-0**	**4-4**	**4-12**	**5-0**	**6-0**	**6-12**



Adjustable Hack-Saw Frames.



For Blades from ins.	8 to 12	10 to 14	12 to 16
Price, complete with Blade .. **Rs.**	**6-12**	**7-8**	**8-8**

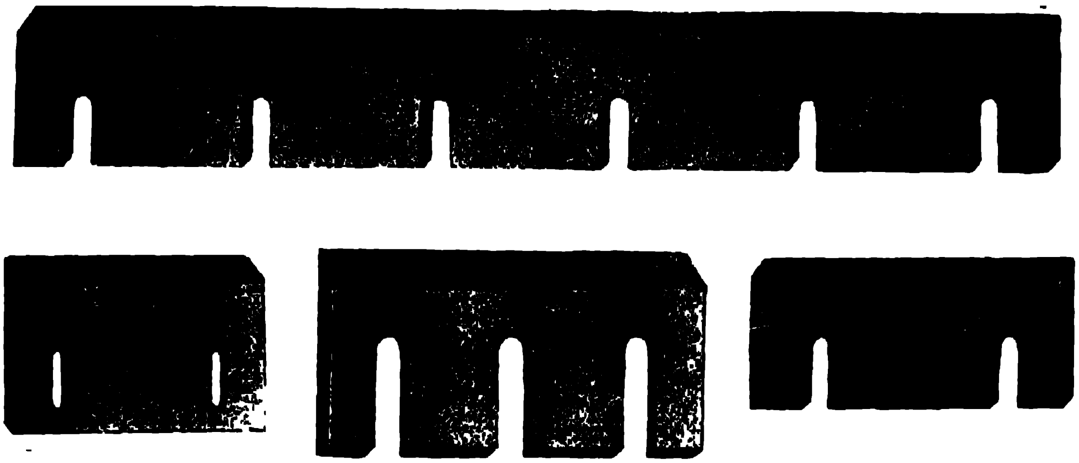
Hack-Saw Blades.

Size .. .. ins.	9	12	14	16
Price, per doz. .. **Rs.**	**2-12**	**4-0**	**4-0**	**4-8**

Blades for Rail Sawing Machine.

17"×2"×$\frac{1}{16}$" .. Rs. 24 per doz.

Planing and Thicknessing Machine Knives.

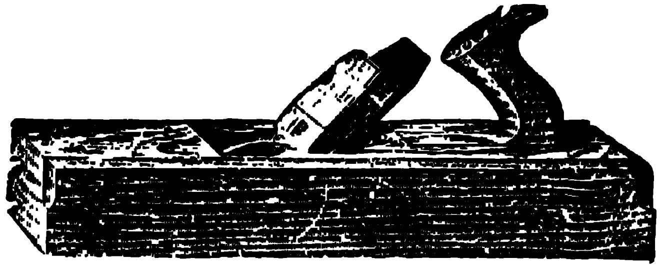


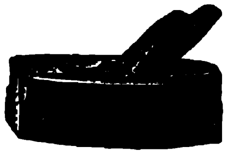
Depth	Up to 3	3½	4	4½	5	5½	6 by 5/16 or 3/8 ins.
Price, per inch of length of cutting edge **Rs.**	**1-3**	**1-4**	**1-6**	**1-8**	**1-10**	**1-12**	**1-14**

The above prices are for knives 4 ins. long and upwards on cutting edge.

Prices for Moulding Cutters, Tonguing and Grooving Irons, Mitreing Knives, Spouting Irons, Rebate and Skew Irons, etc., on application.

Carpenters' Planes.



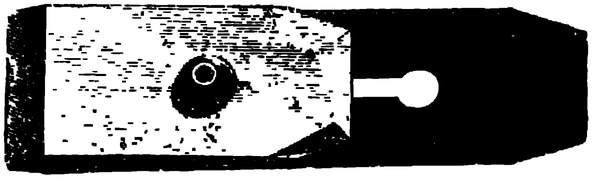


Jack Planes
with double irons.
Size 2¼ ins. **Rs. 10-8** each.

Trying Planes
with double irons.
Size 2⅜ ins. **Rs. 15-0** each.

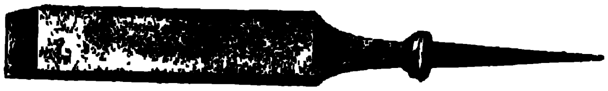
Smoothing Planes
with double irons.
Size 2 ins. **Rs. 7-8** each.

Cast-Steel Double Plane Irons.



Size ... . ins.	1¼	1½	1¾	2	2⅛	2¼	2⅜	2½
Price, each .. .. Rs.	1-12	2-0	2-0	2-4	2-8	2-12	3-0	4-8

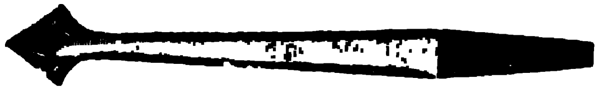
Cast-Steel Firmer Chisels and Gouges.



Size					⅝				1½	1		
C.-S. Firmer Chisels, Price, per doz. Rs.	6 10	6 10	7 6	8 10	9 6	10 2	11 12	12 8	17 4	21 0	25 12	31 4
Do. do. with Bevelled Edges „	12 14	12 14	13 10	14 12	15 10	16 6	18 0	18 12	26 8	30 8	38 4	43 12
Do. Firmer Gouges „	8 4	8 4	9 0	10 2	11 0	12 0	13 10	14 8	20 6	25 0	30 8	37 8

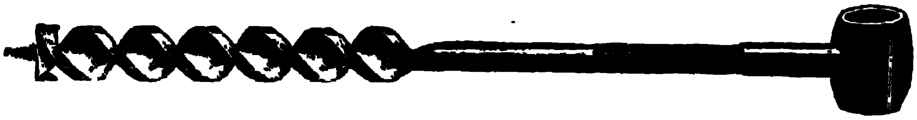
Handles for above, Rs. 4-8 per doz.

Cast-Steel Brace Bits.

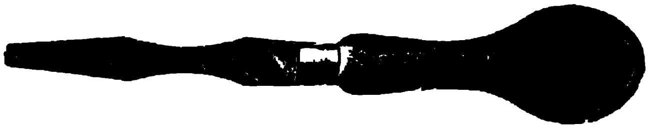


Size .. .. ins.	¼	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1½
Centre Bits, Price, each Rs ..	0 8	0 8	0 10	0 10	0 12	0 12	0 14	0 14	1 0	1 0
Nose „ „ „ „ .. Shell „ „ „ „ .. Spoon „ „ „ „ ..	0 12	0 14	1 0	..	..	.		.		...
Twist „ „ „ „ .	0 10	0 12	...	..	.		..	...	...	..
Rosehead „ „ „ „ ..	0 10	0 10	0 12	0 12	0 14	1 0	1 2	.	.	
Turnscrew „ „ ..	Rs. 12 0 per dozen.									
Taper „ „ ..	Rs. 12 0 per dozen.									
Flat Countersink Bits, Price ..	Rs. 12 0 per dozen.									

Screw-Eyed Augers.

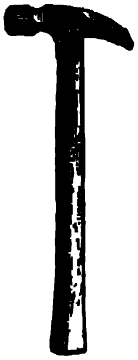


Size ... ins.	¼	⅜	7/16	½	9/16	⅝	¾	⅞	1	1⅛	1¼	1½
Price, per doz. Rs.	21 0	21 0	21 0	21 0	24 0	24 0	30 0	33 0	36 0	40 0	48 0	60 0



London Pattern Cast-Steel Turnscrews.

Size .. ins.	3	4	5	6	7	8	9	10	12	14	16	18
Price, per doz. Rs.	8 0	9 8	11 0	13 0	16 0	18 8	21 0	25 8	33 0	41 0	49 0	58 0



Canterbury Hammers.

Size	No.	2	3	4	5
Price, each	Rs.	2-4	2-8	2-14	3-4

American Felling Axes.

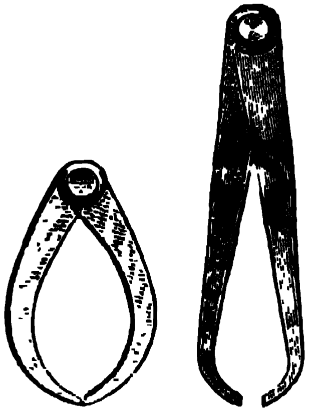
3 lbs.	Price, Rs 3-8 each
3½ lbs.	„ „ 4-0 „
4 lbs. ..	„ „ 4-8 „

Carpenters' Adzes.

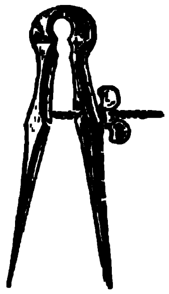
Size, No.	1		
Price, Rs.	3-0	4-0 each.	

Sickles, with Wooden Handles, **Price, Rs. 3-0** each.

Callipers, Compasses and Dividers.



Tempered Steel Firm Joint Callipers.

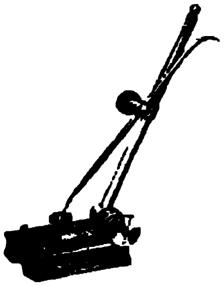


Black Wing Compasses.

Spring and Quick Nut Dividers.

Size		ins.	6	8	10
Steel Callipers	Inside Outside	Price, each Rs.	1-8	2-0	2-12
Black Wing Compasses	...	„ „ „	2-6	3-0	...
Spring and Quick Nut Dividers		„ „ „	5-12	6-8	..

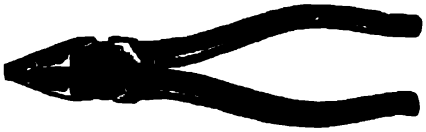
Universal Surface Gauges.



With all latest improvements. With V-shaped hardened base and gauge pins with swivelling spindle and adjusting attachment.

Height ins.	9	12	18
Price, each Rs.	15-	20-0	24-0

Pliers.

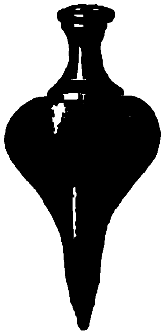


Flat Nose Cutting Pliers.

Size .. ins.	6	8
Flat .. .. Rs. Cutting .. .. „	2-8 pair	3-0 pair.
Electrician's Insulated „	6-4 „	7-8 „

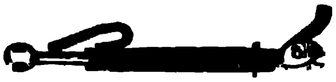
Engineers' Brass Plumbobs.

Screw Tops, Steel Spikes.



Size No.	00	0	1
Weight .. oz.	1¾	2½	3½
Price, each Rs.	1-4	1-8	1-12

Nail Puller.



Size, 19 ins. **Rs. 14-0 each.**

Foot Print Wrenches.

Size, 9 ins. **Rs. 5-8 each.**

Engineers' Surface Plates.

Size .. ins.	10×8	12×10	12×12	18×18	24×18	24×24
Price, each Rs.	65-0	78-0	88-0	150-0	188-0	240-0

Engineers' Squares.

Hardened Steel.

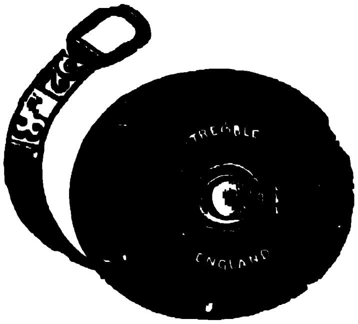
Sizes, 6 and 12 ins.
Price. Rs. 4-8 and **7-12** each.

Parallel Steel Straight Edges.

Sizes, 18, 24, 30, 36, 48, 60 and 72 ins. long.
Price, Rs. 12 per foot.

Miscellaneous Tools.

Measuring Tapes.

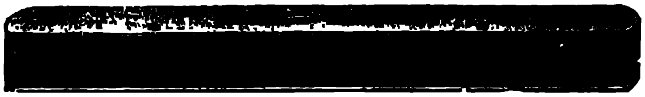


	Length. 50 ft.	Length. 100 ft.
⅝ in. Metallic Tape in case .. **Price, Rs.**	**10-0**	**16-8**
⅝ „ „ „ without case „ „	**6-0**	**11-0**
	50 ft.	100 ft.
⅜ in. Steel Tape in case . **Price, Rs.**	**25-0**	**42-8**
⅜ „ „ „ without case „ „	**17-8**	**34-8**

Spirit Levels.

Brass-plated Top.

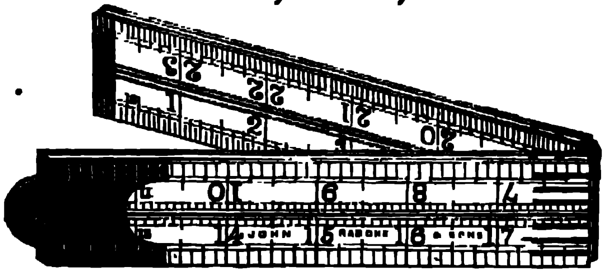
Length ..	ins.	10	12	14	16
Fig. No.		1326	1326	1330	1330
Price, each ..	**Rs**	**2-2**	**2-8**	**5-8**	**6-14**



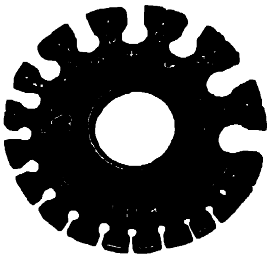
No. 1330.

Foot Rules.

Boxwood, 2 feet, 4-fold.

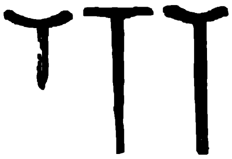


Graduated in 8ths, 10ths, 12ths and 16ths of an inch; 1⅛ ins. wide .. .. Rs. 1-8 each.



Circular Birmingham Wire Gauge.

Round 1 to 30 **Rs. 7-12** each.



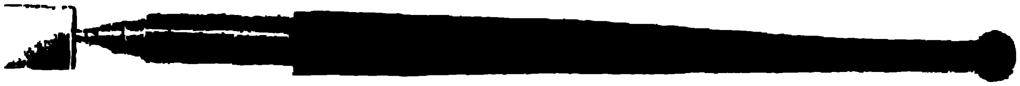
Foundry Chaplets.

Wrought-iron and pure tinned malleable machine made nails and chaplets.

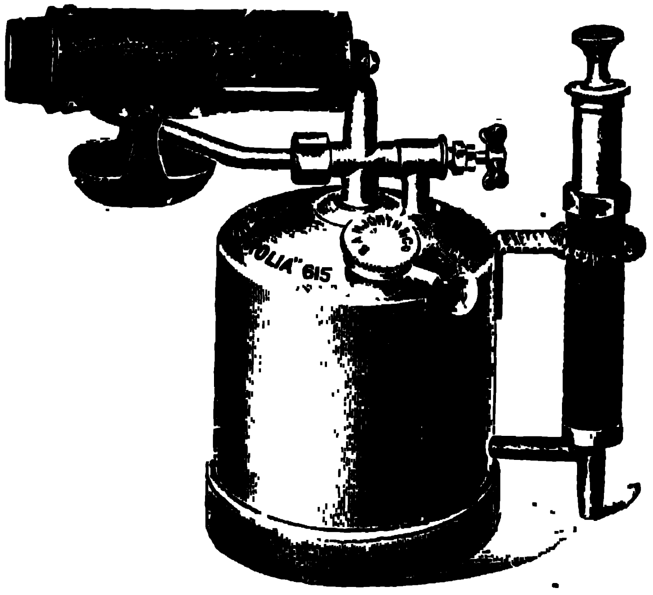
1½ inches to 3 inches	**Rs. 18 per gross.**
3¼ inches and upwards	**„ 24 „ „**

Miscellaneous Tools.

Glaziers' Diamonds.



For cutting thin and ordinary glass .. **Price, Rs. 14-8 each.**



The "Petrolia" Brazing Lamps.

These Lamps burn paraffin which is cheaper and easier to obtain than Benzoline. The burner may be easily cleaned. The tank and all working parts are made of hard non-porous Brass. Being very powerful Lamps they are suitable for Cycle Brazing, etc. The flame is long and concentrated and can be regulated or extinguished easily.

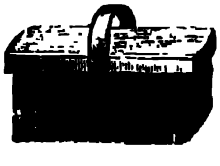
Horizontal type size.	No.	615	618
Paraffin capacity ..	pt.	2½	5¾
Length of ordinary flame	ins.	9	15
Hourly consumption at 60 lb. pressure ..	pt.	2½	4½
Diameter of tank ..	ins.	4¾	5½
Full height ..	"	9¾	14¾
Weight	lbs.	3¾	7
Price	**Rs.**	**32-0**	**58-8**
Spare nipples	"	**4-0**	**7-8**
" leathers	"	**2-0**	**2-0**

Particulars and prices of Inclined or Vertical Burner Lamps on application.

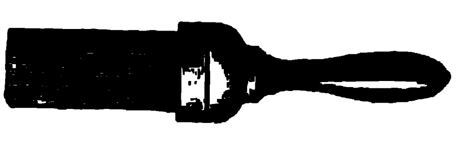
Steel Wire Boiler Tube Brushes.

Size ins.	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Price per doz. **Rs**	**6-8**	**7-0**	**7-0**	**7-8**	**7-8**	**7-8**	**8-0**	**8-0**	**9-8**	**9-8**

Foundry Brushes.



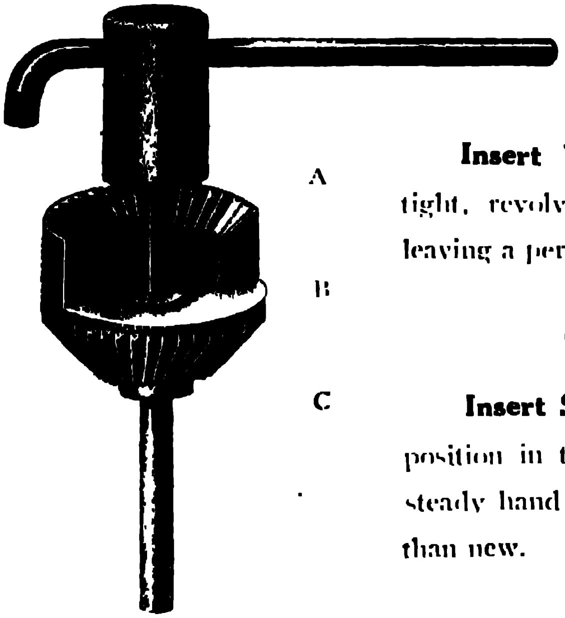
Steel Wire Round. Rs. 16-8 p. doz.
" " **Flat " 15-12** "



Combination Motor Valve Reseater.

For Valves and Seats.

Ensures perfect Gas-tight Valves.



To Operate on the Valve.

Insert Valve Stem through cutter into handle, draw up tight, revolve clockwise, and cutting immediately takes place, leaving a perfect bevel face after two or three turns.

To Operate on the Valve Seat.

Insert Steel Rod through cutter into handle, then place in position in the valve seat. Two or three turns clockwise with steady hand pressure gives a perfect surface, equal to or better than new.

A. Operating Handle; B Reversible Milling Cutter; C Steel Guide Rod.

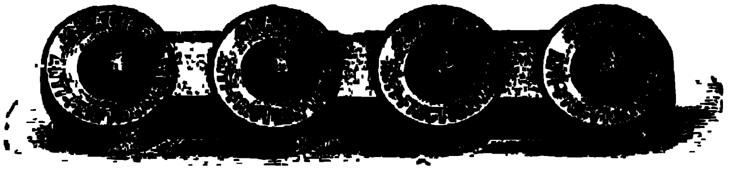
For Valves $1\frac{5}{16}$ ins. diam. and under . . . . Suitable for Alvis, Bean, Coventry Simplex 10 h.p., Douglas 2¾ h.p., Galloway, Standard 10 h.p., etc.	**Price, Rs. 40 each**
2. For Valves 1½ ins. diam. down to $1\frac{5}{16}$ ins. . . . . . . For Belsize 15.9 h.p., Calcott light car, Calthorpe 10 h.p. and 4 h.p., etc.	**48**
3. For Valves 1¾ ins. diam. down to 1½ ins. . . . . . . For A.J.S. 2¾ h.p. cycle, Arrol-Johnston Type "C," Austin 10 h.p. light car, Austin 12 h.p., Belsize, Bradbury 6 h.p. cycle, Bradshaw, Dennis 30 cwt., Douglas 3½ h.p., Ford, Guy 20 h.p. 8 cyl., Guy lorry 25 cwt., Humber 11 h.p., Jap 8 h.p., M.A.S. 7-9 h.p., Rover 8 h.p., Rover 12 h.p., etc.	**54**
4. For Valves 2 ins. diam. down to 1¾ ins. . . . . . . For Overland, Sunbeam 12 h.p., Sunbeam 16 h.p., Sunbeam 3½ h.p., Thornycroft 2 ton, 3 ton, 4 ton or 5 ton, Wolseley 20 h.p., etc.	**63**
5. For Valves 2¼ ins. diam. down to 2 ins. . . . . . . For Arrol-Johnston 15 h.p., Austin 2-3 ton lorry, Austin 20 h.p., Buick, Cubitt, Hotchkiss 22 h.p., Mawdesley 4 ton, Reo. Reiker 30 h.p., Star 15.9 h.p., Swift 10 h.p., Thornycroft, Vauxhall 25 h.p., Wolseley 15 h.p., etc.	**75**
6. For Valves 2½ ins. diam. down to 2¼ ins. . . . . . . For A.E.C. 40 h.p., Dennis 3-4 ton, Guy 2½-3 ton lorry, Talbot 12 h.p., etc.	**90**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Glacier" Anti-Friction Metal.



We can supply from stock "Glacier" anti-friction metal, one of the best and most economical anti-friction metals for all classes of machinery bearings.

For general engineering purposes, and for bearings of straight revolution machinery, we recommend Glacier metal. Owing to the exceedingly low co-efficient of friction, and the compact nature of the alloy, its qualities are clearly demonstrated under high speeds and heavy pressures, and in this class of work especially, it will be found superior to Genuine Tin Babbitt.

It is **Cool Running, Tough** and **Durable, Clean** and **Fluid** in pouring, easy of application, and possesses all the **Anti-Frictional** and **Lubricating** qualities of the best metals now on the market.

Price, As. 11 per lb. or **Rs. 72-0** per cwt.

Findlay's Special Motor Metals.

Manufactured by the Glacier Metal Co., Ltd.

Used by many of the foremost builders of Internal Combustion Engines in Great Britain and elsewhere not only in their standard engines, but also in engines of racing cars.

Motor Metal No. 1. -- This is a homogenous, close-grained alloy of uniform quality, containing over 86 per cent. tin, and is tough and plastic, enabling it to withstand successfully the shocks and jars to which bearings of internal combustion engines are subjected, and the composition is such as to give maximum life and cool running even under excessive speeds.

Price, Rs. 2-8 per lb. in 3½ lb. ingots.

Motor Metal No. 2.—This is also a high-grade tin-base metal toughened with copper equally as cool running as No. 1, but not quite so hard and tough.

Price, Rs. 1-12 per lb. in 4 lb. ingots.

Directions for using White Bearing Metal.

Tinning.—See that the bearing shell is quite clean—heat with a blow lamp or gas blow pipe, and tin with best quality tinman's solder After tinning wipe out surplus solder and flux, and then give a good coating of solder.

Pouring.—After mounting the bearing shell on the mandrel, heat up from the back to a point that will just make the tinned surface run, see that the mandrel is not too hot. To obtain the best results, fill the bearing shell, and puddle with a rod or piece of wire, keeping the shell warm, and slowly feed while puddling. This will eliminate air holes and take up shrinkage. It is better to over-fill, as the surplus metal is easily removed.

If the bearing does not ring after lining, it is because of defective tinning, and should be re-tinned and re-lined, cracked bearings or bearings with holes drilled through, will rarely ring true.

Bearings working under moderate conditions need not necessarily be tinned, provided provision is made for holding in the metal, by recesses.

Temperature of Metal.—Over-heating is a danger to most metals, and the best temperature for pouring is 600°F. (315°C.)—except in the case of metals carrying a large percentage of copper, like Findlay's Motor Metal No. 1.—For this type of metal 650°F., (343°C.) is more satisfactory.

A bluish tint on the surface is generally an indication that the metal is too hot. Metal is usually hot enough for pouring when it browns a piece of paper or white soft wood dipped into the metal below the surface.

Stirring.—Metals should be well stirred from the bottom before pouring, more especially if melted in an open pot with the heat concentrated on the bottom. A melting pot with enclosed burner is advisable if procurable, as the heat is more evenly distributed.

Don't Forget to Stir. Don't Mix Different Grades of Metal.

Edgar Allen and Co.'s Tool Steel.

As Sole Agents for Messrs. Edgar Allen and Co.'s Tool Steels we can offer from stock a large selection of their steel for metal cutting, Rock Drilling, constructional purposes, etc., etc

In our own workshops at Howrah, Garden Reach, and Jamshedpur, Messrs. Edgar Allen and Co.'s Tool Steels are used exclusively and very satisfactory results are obtained.

The Choice of Tool Steels.

When to use High Speed Steel.

High Speed Steels are Alloy Steels containing considerable percentages of Tungsten. They are called High Speed Steels because Tools made of them may be worked at excessive speeds and heavy cuts taken without the cutting edges of the Tool being affected by the heat generated. A Tool made of High Speed Steel will go on cutting even when heated to a visible dull red. They are therefore used for lathe-planing and slotting-tools, milling-cutters, twist-drills, reamers, countersinkers, hot punches, etc., where the best performance is demanded. Edgar Allen's "Stag Special" and "Air-hardening" High Speed Steels are types of these high-grade steels. Although some at least of the Tools mentioned can be made with less expensive Steels, absence of breakdowns and of spoilt work is more important than cheap Tools.

When to use Carbon Tool Steel.

When a Steel Tool is cutting at a high speed, or doing other work of a severe character, great heat is generated by friction. If the Tool becomes overheated, the temper is drawn and the Tool breaks down. Carbon Tool Steels fail at a much lower temperature than High Speed Steels or certain special Alloy Steels. Therefore, in considering whether a Carbon Tool Steel may be used for any particular purpose, this is the principal point to watch. If the work to be performed by the Tool will not generate much heat, then a Carbon Tool Steel may be used. Rock Drills, Blacksmiths' Tools, Chisels, Files, Hammers, etc., are all Tools in which Carbon Tool Steel is efficient.

Plain Carbon Tool Steel is made at the Edgar Allen Works by the Crucible Process, using the finest Dannemora Iron as a base.

When to use Special Alloy Steels.

The character of Plain Carbon Steel is capable of being altered by adding, in varying quantities, Nickel and certain rare metals. Special Alloy Steels containing Nickel, or combinations of Nickel and Chromium or Chrome-Vanadium, are largely used for Motor Car and Aircraft construction. Such Alloys combine extreme toughness with great strength.

There are, however, certain Special Alloy Steels containing Tungsten, Vanadium, Chromium, Molybdenum, and other rare metals, either singly or in combination, which give to Tool Steels increased hardness, toughness, or other peculiar properties, making them particularly valuable for various special purposes. Edgar Allen's "Imperial," "Red Label," and "K 9" Steels are examples, and are described on pages 85 and 86

Edgar Allen & Co.'s Tool Steel.

Stag Special

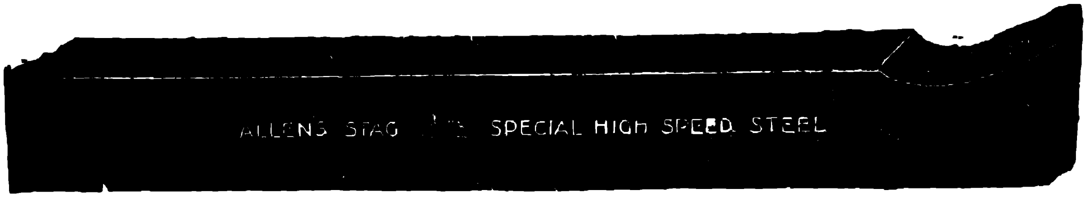
STAG BRAND

First Grade

High-Speed Steel.

For certain work, tools of high quality sometimes fail. Worn steel tyres, hardened by the friction of brakes, are for instance a very difficult job. So are all alloy and high tensile steels. Trouble is also apt to be caused by tools, ordinarily quite competent, breaking down when an exceptionally hard piece of any Steel has to be turned or slotted. It is to minimize these and other mischances that Edgar Allen's "Stag Special" High Speed Steel (18 per cent. Tungsten) is recommended.

There is, in addition, a "Stag Extra Special" High Speed Steel (22 per cent. Tungsten) for use where the difficult nature of the work to be done renders it imperative to have the costliest steel because no others could do it. Edgar Allen's "Stag Special" is, however, suitable for most purposes, and on ordinary work it is sometimes quite economical to employ a high grade Steel of this character, its longer life offsetting the initial cost.



Lathe Turning Tool of Edgar Allen's "Stag Special" High Speed Steel.

Tools for which Edgar Allen's "Stag Special" Steel should be used.

Boring Tools.	Planing Tools.
Lathe Tools.	Slotting Tools.

Cutters, etc.

"Stag Special" can be hardened either in a Blast of Cold Air, or in Oil.

Stag AIR-HARDENING High-Speed Tool Steel.

Edgar Allen's "Air-Hardening" Tool Steel is made, and its composition supervised, with the same care as Edgar Allen's "Stag Special." It is especially praised by users for roughing work at quick speeds, and with heavy cuts, and it has a wide range of usefulness, cutting forged steel, steel castings, wrought or cast-iron, and brass equally well.

Tools for which Edgar Allen's "Air-Hardening" High-Speed Steel should be used.

Twist Drills.	Reamers.
Milling-Cutters.	Rose Bits.
Hot Punches.	Pneumatic Chipping Chisels, etc.

'Air-Hardening" Steel can be hardened either in a Blast of Cold Air, or in Oil.

Prices of High-Speed Steels.

Brand.	Sizes.	Prices, for Standard sections over ½ in. and in stock lengths.
"Stag Extra Special" High Speed Steel	Squares and Rounds ¼" to 3", Flats	Rs. 3 12 per lb.
"Stag Special" High Speed Steel ..		„ 2 12 „
"Stag Air-Hardening" High Speed Steel		„ 2 4 „

Prices for other Sections and Sizes on application.

Edgar Allen and Co.'s Tool Steel.

Treatment of High-Speed Steels.

Edgar Allen's "Stag Special" and "Air-Hardening" Steels should be annealed and hardened in the same way. The whole art of working High-Speed Steel successfully, depends upon the simple process of heating it. The most useful hint we could give to any blacksmith would be:—

Warm the Steel before you place it actually in the fire, then heat up slowly, thoroughly and evenly.

If this simple hint is followed, it is practically impossible to spoil the steel. The reason for laying so much stress on this point lies in the fact that this steel is much denser than ordinary steels. Heat takes longer to penetrate it, and consequently, if a bar is placed directly into a hot fire, the outside expands more quickly than the interior, thus causing an internal "clink." To the eye the bar appears as before, and even when the tool is hardened and ground, still no flaw can be detected. When put to work, however, the tool breaks, the fractured surfaces showing those "cup and egg" shape appearances so characteristic of careless heating.

Always heat the steel before cutting it. Forge it at a lemon colour (1100-1150° C); re-heat when forged, and set aside to cool. Do not omit the re-heating; it takes away the forging strains When cold the tool may be rough-ground to shape if necessary.

Harden by re-heating only the cutting edge of the tool, to a white heat (1250° C) and cool out quickly in either a strong blast of cold air, or oil. Two hints should be noted:—

Heat up very carefully till the forging heat is passed, then more rapidly to the final heat. If you cool in oil, cool only the cutting edge, and keep it moving.

If the tool is hardened too far up, trouble in several directions may be confidently expected. No tempering is required for turning tools, etc., but cutters may be tempered at about 200°C. Grind on a wet grindstone or wet emery wheel: the former is better.

Annealing.

The Steel should be gradually heated in an air-tight receptacle, packed with either lime or a mixture of fireclay and charcoal, to a bright red or dull yellow heat (a slightly higher heat than is necessary for annealing ordinary tool steel).

When sufficient time has elapsed for a uniform heat to have penetrated through to the centre, cool off as slowly as possible until quite cold. If the heating has been done in a furnace, the furnace should be allowed to cool down with the steel in it. If the heating has been done in a forge, the receptacle should be covered with red hot coals and left till cold. A ready method, which answers well enough for many purposes, is to heat the steel to a red heat (not over) and quickly bury it in lime, which only allows it to cool very slowly.

Hardening Milling-Cutters.

To preserve the cutting edges from corrosion, etc., the cutters must be heated up in a closed receptacle, and may be covered with some kind of silica paint as a further protection. They must be heated to the temperature already given, and the precautions against too rapid heating cannot be too strictly observed. Cool out in Fish, Lard, or Cottonseed Oil, and temper (so as to relieve hardening strains) by placing in oil and heating to 175-225° C.

Edgar Allen & Co.'s Tool Steel.

IMPERIAL Special Alloy Steel.

For Turning and Finishing.

Fractures of this Steel show an extreme fineness of grain, having a delicate, silky appearance. This appearance would, by itself, lead an expert to expect the Steel, in its hardened condition, to take an extremely fine edge, and to hold it. Under a fairly low magnification, any edge shows greater or less irregularity, in proportion as the grain of the steel is fine or coarse. The smooth edge given by the very fine texture of this Alloy Crucible Steel makes it suitable for tools used in the best finishing work, and the edge lasts because there are no microscopic irregularities to turn and blunt the cutting surface.

The permanent hardness of the Steel makes it a favourite for turning, planing and drilling Brass, Chilled Iron and the hardest class of materials generally.

This Steel is water-hardening and gives uniformly satisfactory results thus. It can, if required, be made suitable for oil-hardening as a special precaution against any remote liability to crack, although most users prefer the water-hardening condition.

This Steel is especially recommended for tools used in fluting chilled Flour Rolls, and for Lathe, Planing and Slotting Tools, Drills, etc.

Treatment.

Heat the Steel (away from the blast) to a bright red, then forge and set aside to cool. Don't hammer it when it has cooled below a dull red. Re-heat (only the cutting edge) to a dull red heat (720° to 760° C.) and cool down in lukewarm water. It is not necessary to temper Lathe or Planing Tools, but Drills should be tempered to a dark straw colour.

The precautions against too rapid or irregular heating already given for High-speed Steel apply with equal force in this case.

Squares and Rounds ¼ in. to 3 ins., Flats. Price, Rs. 1-9 per lb.

Prices for other Sections and Sizes on application.

"Red Label" Tool Steel.

This is a Tungsten Alloy Crucible Steel for Twist Drills, Taps, Milling-Cutters, Key-seating Cutters, End-mills for Brasswork, Reamers, and other Tools of a similar function.

The Tungsten here added in the right proportions and in the right way gives to ordinary carbon steel certain properties of great importance without unreasonably increasing the cost.

The distinctive merits of this Steel, which is increasingly demanded for important work where exact and regular performance is indispensable, are its exceptionally deep hardening and the great density of its structure. This quality ensures accuracy in the tools made, and it takes and holds (if required) a razor sharp edge.

Treatment of "Red Label" Steel.

Heat carefully and thoroughly to darkish cherry-red heat, say 760°-780° Cent. (1400°-1436° Fahr.), and harden in clear water at about 15° Cent. (60° Fahr.). It should be remembered that small sections of steel will harden at a lower temperature than more bulky pieces. Small sections may be hardened at even a lower heat than stated, and the lowest heat at which a steel will harden is always the best. Afterwards temper to a straw colour for such things as taps, etc.

In Standard Sections. Price, Re. 1-0 per lb.

Edgar Allen & Co.'s Tool Steel.

"K 9" Tool Steel.

(Oil Hardening.)

For Tools of Extreme Accuracy.

Where the form of the finished tools is of very particular importance, as in Master Tools, Gauges, and certain Dies, Stay-taps, Milling-cutters and the like, a Steel selected for its freedom from variation under treatment must be used. Steels which require water-hardening show a varying amount of distortion, however dense their structure. The process of hardening is a critical moment in the making of any steel tool. The finished piece may not come out of the quenching bath exactly as it went in. This is ordinarily unimportant, and a Steel of Edgar Allen's "Red-Label" type gives perfect results. But for the special cases mentioned at the outset, a Steel is called for that practically eliminates all contraction and expansion ordinarily set up in the hardening process.

To meet the demand for a Steel that can be relied upon to keep its shape, a Steel has been perfected, known as Edgar Allen's "K 9" Oil-hardening Tool Steel. This is treated with very great care through all stages of its manufacture, from ingot to finished bar, by methods which give it the extremest attainable fineness of grain. Tools requiring the highest accuracy can be hardened and tempered to any extent if made of "K9" Steel, without the least danger of variation in size or contour, and its toughness and resistance to wear make it economical in use. It is also, fortunately, very easy to treat. Steels of this character sometimes present difficulties in handling, from which Edgar Allen's "K9" is, by exception, happily exempt.

It is delivered ready-annealed for machining, each bar being carefully varnished against rust.

Treatment of Edgar Allen's "K 9" Steel.

The temperature and treatment given below for various uses will serve as a guide to the tool-maker. As with all steels, his own skill and experience must co-operate for the production of perfect results, but Edgar Allen's "K 9" will be found in practice exceptionally easy to work. Heat slowly and thoroughly to cherry-red heat, say 780°-800° Cent. (1436°-1472° Fahr.) Quench in oil. For threading-dies, stamping-dies, stay-taps, etc., temper to a straw colour. For punches, drills, cutting-dies, etc., temper to a dark straw colour.

In Standard Sections. **Price, As. 11 per lb.**

Special Steels for Motor Cars, Aircraft, etc.

Nickel Steels, for axles, Fork Joints, Transmission shafts, gearing, etc.
Nickel Chrome Steels, for gear wheels and parts subject to abnormal wear.
Chrome Vanadium Steels, for crankshafts, axles, connecting rods, etc.
Special High per cent. Nickel Steels, for valves of explosion engines. Resists shocks and corrosion.
Silicon Steels, for Gears, etc.

L. S. D. > **Case-hardening Steel.**
Special Spring Steel.
Self-hardening Steel.

Permanent Magnet Steel.
40-ton Steel,
etc., etc.

Prices on application.

Edgar Allen & Co.'s Tool Steel.

L. S. D. Carbon Tool Steels.

A Series of Standardised Water-hardening Carbon Steels, for Engineers, Smiths, Boiler-makers, etc.

It is difficult to standardise the numerous Steels required for the cheaper types of Tools, because of the fine variations in hardness and quality necessitated by differing kinds of work on the one hand, and competition between tool-makers on the other. Work done upon one metal may require a Steel of great hardness, while exactly the same work upon another metal may be just as well done with a milder steel.

The various Steels in this class have been standardised, as far as they can be standardised at all, in the present series of Carbon Tool Steels. Steels of the same standard quality cannot be bought cheaper, and cheaper Steels cannot be safely bought for the same purposes.

Class H.—Suitable for Dies (especially Mint Dies), Taps, Reamers, Milling Cutters, Lathe Planing and Slotting Tools, Drills, Punches, etc., etc.

In Standard Sections. Price, Rs. 120-0 per cwt.

Class E.—Suitable for Wood Working Tools, Chisels, Punches, Smiths' Tools, Spare Blades, Snaps, Drills, Lathe Planing and Slotting Tools, Reamers, Taps, Screwing Dies, Milling Cutters, etc., etc.

Squares and Rounds ¼ in. to 3 ins. and Flats.

Standard Sections over ½ in. and in Stock Lengths. Price, Rs. 82-0 per cwt.

Class C.—Suitable for Shear Blades, Wood cutting Blades, etc. Flats.

Standard Sections over ½ in. and in Stock Lengths. Price, Rs. 68-0 per cwt.

Class F.—Suitable for Tools same as Class E of ordinary quality.

Squares and Rounds ¼ in. to 3 ins. and Flats.

Standard Sections over ½ in. and in Stock Lengths. Price, Rs. 58-0 per cwt.

In each of the classes steels are supplied, according to purpose, in six degrees of hardness. Each bar is marked with the class letter (H, E, F, or C), and with a Temper-number 1 to 6. Number 1 is the hardest.

Temper No. 1.	(1.35% Carbon). Suitable for extra hard Planing, Slotting and Turning Tools, Drills, etc.
Temper No. 2.	(1.20% Carbon). Suitable for Lathe Tools, Drills, and Small Cutters.
Temper No. 3.	(1.05% Carbon). Suitable for Large Turning Tools, Cutters, Taps, Reamers, Drills, Shear Blades, Punches, etc.
Temper No. 4.	(0.90% Carbon). Suitable for Cold Chisels, Shear Blades, Hot Sates, Taps, Miners, Drills, etc.
Temper No. 5.	(0.75% Carbon). Suitable for Chisels, Sates, Blacksmiths' Tools, etc.
Temper No. 6.	(0.60% Carbon). Suitable for Boiler-makers' Tools, Hammers, Miners' Tools, etc.

"DOLPHIN" BRAND

"Dolphin" Brand Tool Steel

Suitable for Smiths' Tools, Chisels, Drills, Sates, Hammers, Miners' Tools, etc., etc.

Sizes, Squares and Rounds ¼ in. to 3 ins., Flats, Ovals.

Standard Sections over ½ in. and in Stock Lengths. Price, Rs. 42-8 per cwt.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Edgar Allen & Co.'s Tool Steel.

"Stag Brand" Mining Steels.

"STAG" BRAND

"Blue Label."—This is a special Steel for Miners' Tools, Jumpers, Crowbars, Drills, Chisels, Wedges, etc., and is suitable for extra hard materials

Sizes, Octagons, Hexagons, Ovals.

Standard Sections over ½ in. and in stock lengths. Price, Rs. 48-0 per cwt.

"Green Label."—A special Steel for Miners' Tools as above, but for ordinary working conditions

Sizes, Octagons, Hexagons, Ovals.

Standard Sections over ½ in. and in stock lengths. Price, Rs. 33-0 per cwt.

Treatment.

Forge, at a bright red heat, and do not allow the heat to go higher up the steel than necessary. For sharpening, the point should be hammered lightly and quickly.

Harden, at a cherry red heat but not more than 1 in. from the cutting point; it should then be dipped in cold water about ¾ in leaving ¼ in., at a dark red heat

Temper (if required) when colour at extreme point is a dark straw, by plunging Drill into water, taking care that no part of the Drill when plunged is at a red heat.

Treatment of Edgar Allen's Carbon Tool Steels.

All Tool Steel should be heated slowly, evenly, and thoroughly before it is forged; and for hardening it should be re-heated also slowly and evenly.

The result of quick, uneven, and partial heating is to set up strains in the steel, and to render it very liable to crack when plunged into water.

Carbon Tool Steels should be hardened at the lowest heat which will ensure the required hardness

When steel has been overheated, the fracture is coarse, and shows bright specks; whereas properly hardened steel presents a close, uniform fracture, approaching that of china.

Too much cold hammering after a Tool is formed destroys the structure of the Steel, and the cutting edge invariably fails after such improper treatment.

Heating and Forging.

The Steel should be heated slowly and thoroughly for Temper Nos. 1, 2 and 3, to Cherry Red Heat (825°C.) and for Temper Nos. 4, 5 and 6 to Bright Red Heat (950°C.), then forged to the shape required, and allowed to cool.

Hardening.

Always re-heat the piece of steel after forging, for hardening. Re-heat the steel as uniformly as possible for:—

Temper Nos. 1 and 2 to Dull Red Heat (780°C.)
Temper Nos. 3 and 4 Dark Cherry Red Heat (800°C.), and
Temper Nos. 5 and 6 Cherry Red Heat (825°C.), and quench in water.

Tempering.

The object of this process is to take away excessive brittleness of a hardened tool, and to relieve hardening strains. It is effected in a simple way by knowledge of the fact that a polished steel surface oxidizes on being heated, and the colours due to oxidation vary according to the temperature.

In tempering a tool, it is usual to rub the part to be tempered with a piece of sand-stone or emery cloth, so that the surface is sufficiently clean to show the colours. Then the tool is heated to the hardening heat and the cutting edge quenched in water, and quickly withdrawn so as to leave sufficient heat in the body of the tool to re-heat the part to be tempered, and when the proper colour has reached the part to be tempered the tool is again quenched. In the case of milling-cutters, etc., the cutter can be first hardened and then warmed upon a plate till the desired colour is arrived at, and then quenched again in water.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Edgar Allen & Co.'s Steel.

"Stag Brand" No. 1 Quality.

"STAG" BRAND

Guaranteed Spring Steel.

Large quantities of this steel is supplied for Locomotive, Carriage and Wagon work on Indian Railways.

Flats.	Rs.	
¾×¾	Rs.	32 0 per cwt.
1×¼	"	24 0 per cwt
1×⅜	"	
1¾×¼	"	
2×¼	"	
2×⅜	"	
2½×⅜	"	
2¾×½	"	
3×¼	"	
3×5/16	"	
3×⅜	"	
3×½	"	

Flats.	Rs.	
3⅛×7/16	Rs.	24 0 per cwt.
3½×5/16	"	
3½×⅜	"	
3½×7/16	"	
3½×½	"	
3½×⅝	"	
4×⅜	"	
4×½	"	
4½×7/16	"	
4½×½	"	
5×⅜	"	
5½×½	"	
6½×⅜	"	

Rounds.	Rs.	
¼	Rs.	35 0 per cwt.
⅜	"	27 8
½	"	26 0
9/16	"	25 0
⅝	"	
¾	"	
1	"	
1½	"	
Squares		
¼	"	35 0
5/16	"	
⅜	"	27 8
½	"	26 0

Prices for other Sections and Sizes on application.

Extracts from British Standard Specification for Spring Steel, for Laminated, Volute and Helical Springs.

Laminated Springs.—The Spring Plates and Bars shall be manufactured from the highest quality of Steel made from the best selected material by the acid open hearth process, and must not show on analysis more than 0.8 per cent. nor less than 0.5 per cent. of Carbon, nor more than 0.05 per cent. of Sulphur or of Phosphorus. The Steel Plates or Bars to be used for top plates which have to be welded at the eye must not contain more than 0.7 per cent. nor less than 0.45 per cent. of Carbon.

The Steel when rolled must be perfectly smooth on its surface, free from defects of any kind, and true to section. A concavity of 1|64 inch each side will be allowed in the rolled bars.

Test pieces to the extent of 3 per cent. of the plates included in a delivery shall be taken from the bulk and tested in the presence of the representative of the Engineer (or of the Purchaser), and must comply with the following test:—

Pieces of the steel 30 inches long shall be cambered to a radius of 80 times their thickness, hardened and tempered, and, after being pressed straight once and the camber carefully noted, must stand being pressed straight again six times in quick succession without showing any permanent set.

Volute and Helical Springs.—The Springs shall be manufactured from the highest quality of Steel made from the best selected material by the Acid Open Hearth process, and must not show on analysis more than 1.3 per cent. nor less than 0.8 per cent of Carbon, and not more than 0.05 per cent. of Sulphur or of Phosphorus.

The Steel when rolled must be perfectly smooth on its surface, free from defects of any kind, and true to section.

Each Spring shall be tested by being driven home once by a quick-acting scrag, the height being carefully noted after release. The Spring must then stand being driven home again five times in quick succession without showing any permanent set. Up to 5 per cent. of the Springs shall be tested under varying loads to determine range and deflection per ton.

The workmanship shall be of the highest character, care being taken when coiling that the coils are uniformly spaced, and none of them in contact. Any Spring standing under the specified height, or more than ½ inch over the specified height, unloaded, will be rejected.

All Springs shall be hardened in oil and tempered in a bath of molten lead.

Trucks and Barrows.

We are in a position to quote for all types of Trucks and Barrows for the efficient transportation of goods. The maker's lists showing many hundreds of types and sizes will be forwarded on application.

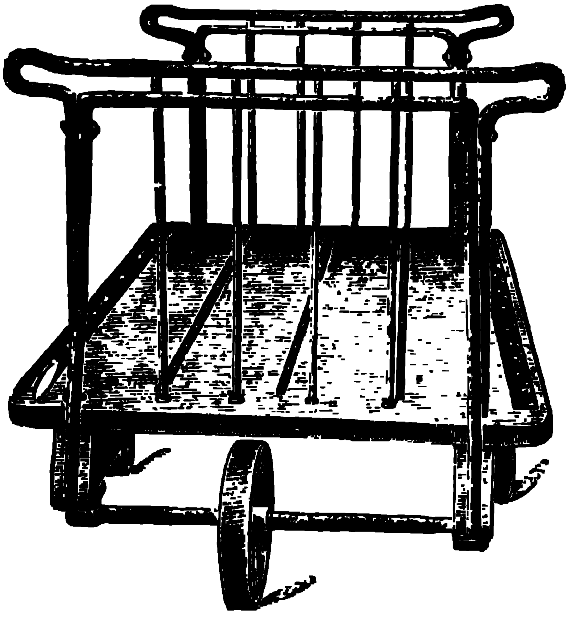


Fig. 218.

Fig. 218. Platform Truck.

As used by most of the principal railway companies. Each Truck is fitted with four wheels of which the two end ones are made to slide thus enabling the Truck to revolve in its own length.

They are constructed of hardwood beams and platform, the latter having half round iron binders on top, and can be fitted with either solid cast-iron or split wheels with detachable I.-R. Tyres

Length (Inside).	Width	Height of Uprights.	Dia. of Wheels.	To carry lbs.
60 ins.	36 ins	24 ins.	12 ins.	1,700

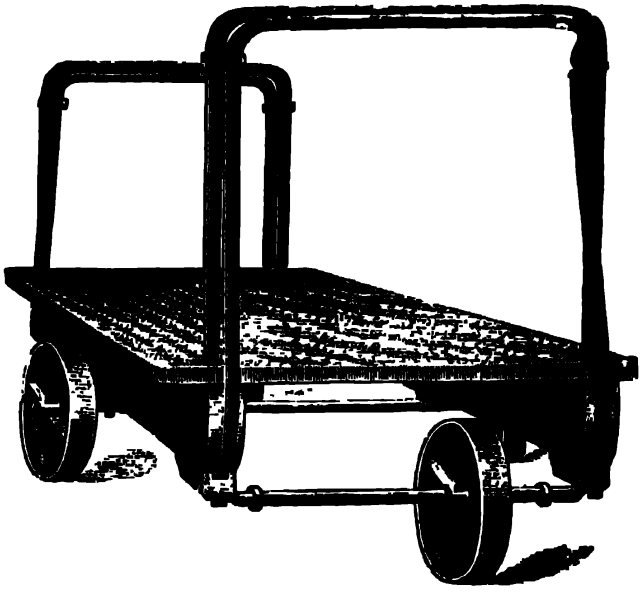
Price, fitted with sliding split wheels and detachable I.-R. Tyres .. **Rs. 260** each.

Fig. 220. Platform Truck.

This type of Truck is similar to Fig. 218, but fitted with four single uprights, and without half round iron binders on the platform.

Length (Inside).	Width.	Height of Uprights.	Dia. of Wheels.	To carry. lbs.
72 ins.	36 ins.	24 ins.	12 ins.	1,700

Price, fitted with sliding split wheels and detachable I.-R. Tyres .. **Rs. 240** each.

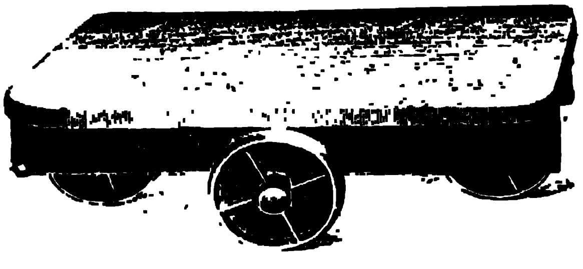


Spare Split Wheels.

Fig. 1350C with detachable I.-R. Tyres suitable for Platform Trucks Figs. 218 and 220. Diameter of Tyre 13½ ins.

Price, Rs. 21 each.

Sliding Wheel Bogies.



Constructed of hardwood beams and platform, and fitted with steel axles, cast-iron wheels and axle boxes.

		204	205	206	207	208	209	210
Figure Nos.		204	205	206	207	208	209	210
Length ..	ins.	30	36	42	48	54	60	72
Width ..	„	20	21	24	26	30	36	86
Height ..	„	8	9	9½	11	11½	15½	15½
Dia. of Wheels	„	5½	6½	6½	8	9¾	12×2	12×2
To Carry		700 lbs	800 lbs.	900 lbs	1,000 lbs.	1,200 lbs	1,500 lbs	1,700 lbs
Price, each Rs.		**36-8**	**40-8**	**46-0**	**70-0**	**90-0**	**125-0**	**135-0**

The above can be fitted with detachable uprights and|or T. pull handles at a small extra cost.

Prices on application if fitted with Split Wheels and Detachable I.-R. Tyres.

Heavy Package Bogie.

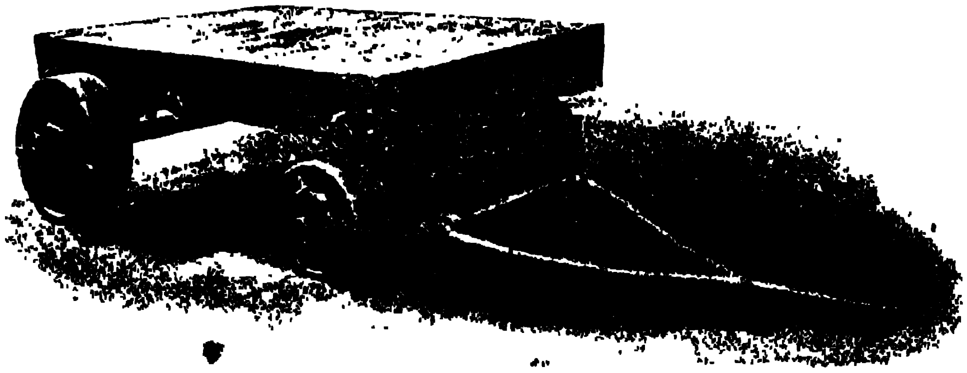
Fig. 211. Similar to the above.

Length.	Width	Height	Dia. of Wheels.	To carry	**Price each.**
50 ins.	30 ins.	11½ ins.	9¾ ins.	1,200 lbs.	**Rs. 100**

Fitted with detachable uprights and|or pull handles at a small extra cost.

Prices on application if fitted with Split Wheels and Detachable I.-R. Tyres.

Heavy Material Trolley.

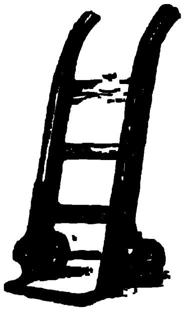


Made with strong channel steel frame, wide flanged wheels, bogie front wheels and drag handle. This Trolley will be found very suitable for handling boilers and heavy machinery.

Prices according to size and capacity.

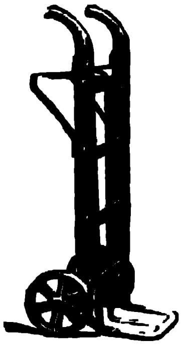
Two-Wheel Hand Trucks.

Constructed of hardwood and fitted with Steel Axles and Cast-Iron Wheels.

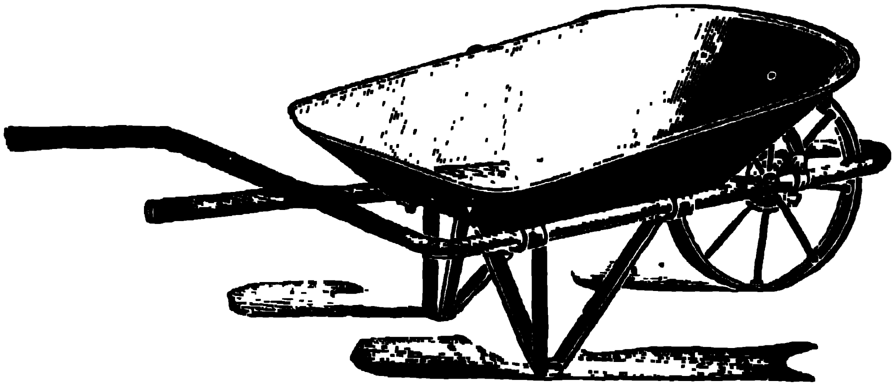


	Liverpool Sack Trucks.	Bag Trucks	Boston Warehouse Trucks.
Length .. ins.	42	48	50
Dia. of Wheels „	8	6½	6½
Foot Iron „	4	.	5
Weight .. lbs.	40	44	42
Price, each . Rs.	**35-8**	**40-8**	**42-0**

Prices for many other types on application.



Steel Wheel Barrows.



All-Steel Tubular Wheel Barrows.

Solid Pressed Seamless Trays and Round Spoked Malleable Wheels.

Size of Tray.	Capacity.	Weight.	Dia. of Wheel.	Price
32"×29"×7" deep ×15 B. W G.	3 c.ft.	70 lbs.	16"	**Rs. 39**

Light Coal or Coke Barrows.

Pressed and Folded Trays and W.-I. Wheels.

Size of Tray.	Capacity.	Weight.	Dia of Wheel.	Price
30"×27"×12"×18" B. W. G.	2¾ c.ft.	50 lbs.	16"	**Rs. 27**

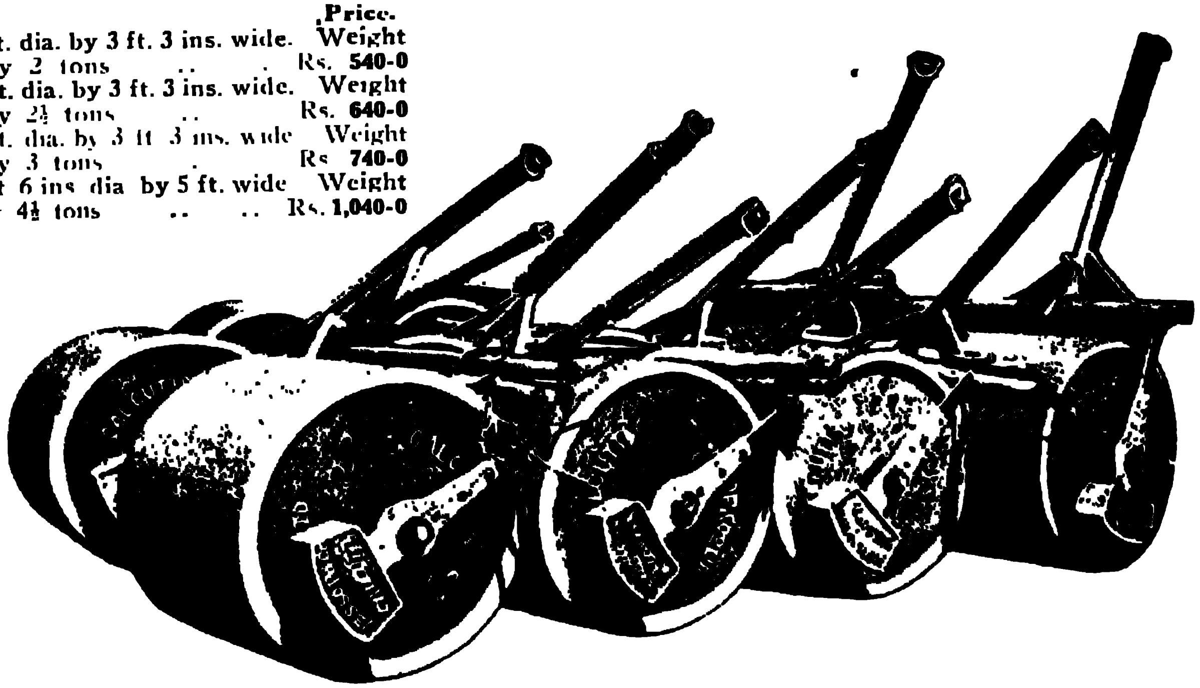
Prices of other types of Trucks, Barrows, Hand Carts, etc., to suit all purposes on application.

Bullock Power Road Rollers.

Reversible Water Ballast Type.

The following are our stock sizes and the prices include yokes and chains:—

	Price.
Size, 4 ft. dia. by 3 ft. 3 ins. wide. Weight Empty 2 tons .. .	Rs. 540-0
Size, 4 ft. dia. by 3 ft. 3 ins. wide. Weight Empty 2½ tons ..	Rs. 640-0
Size, 4 ft. dia. by 3 ft. 3 ins. wide Weight Empty 3 tons .	Rs 740-0
Size, 4 ft 6 ins dia by 5 ft. wide Weight Empty 4½ tons	Rs. 1,040-0



The above illustration is taken from a photograph of some of the rollers supplied by us for the Midnapore district We have made hundreds of these rollers for all parts of India and its dependencies and have adopted this design as our standard for all requirements.

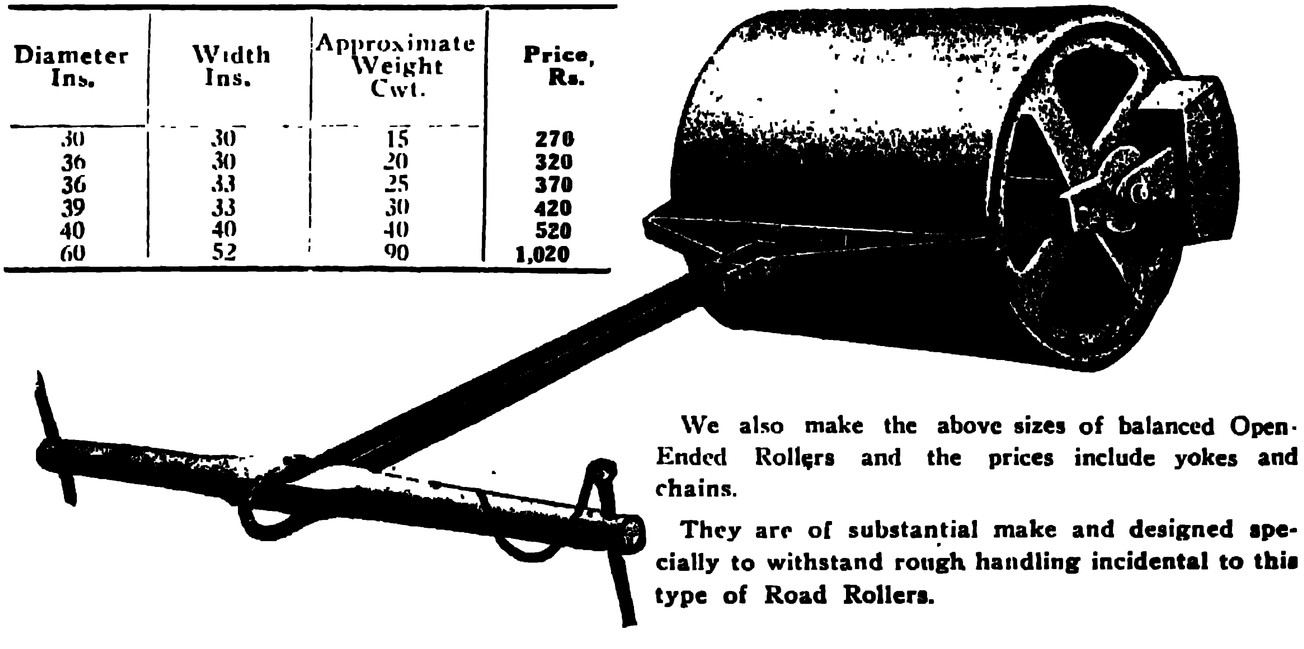
The advantage of these rollers over those with open ends is that the weight can be adjusted at pleasure by increasing or decreasing the quantity of water, sand or other ballast in the cylinder, which is water-tight, to suit the condition of road-metalling, a very short time being occupied in removing the doors and putting in the filling material.

Bullock Power Road Rollers.

Open-Ended Type.

Prices and particulars of Open-Ended Type.

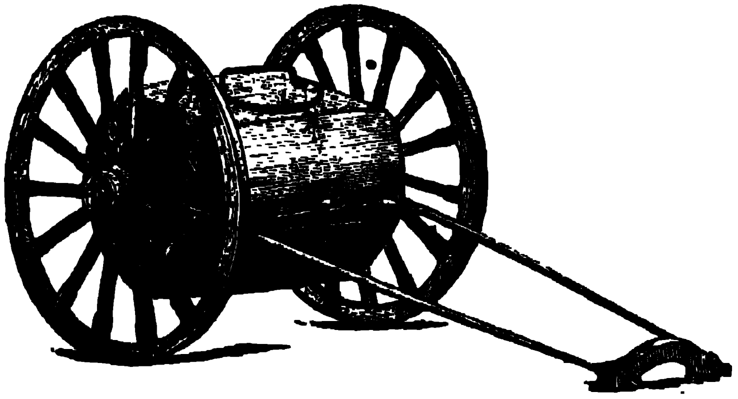
Diameter Ins.	Width Ins.	Approximate Weight Cwt.	Price, Rs.
30	30	15	270
36	30	20	320
36	33	25	370
39	33	30	420
40	40	40	520
60	52	90	1,020



We also make the above sizes of balanced Open-Ended Rollers and the prices include yokes and chains.

They are of substantial make and designed specially to withstand rough handling incidental to this type of Road Rollers.

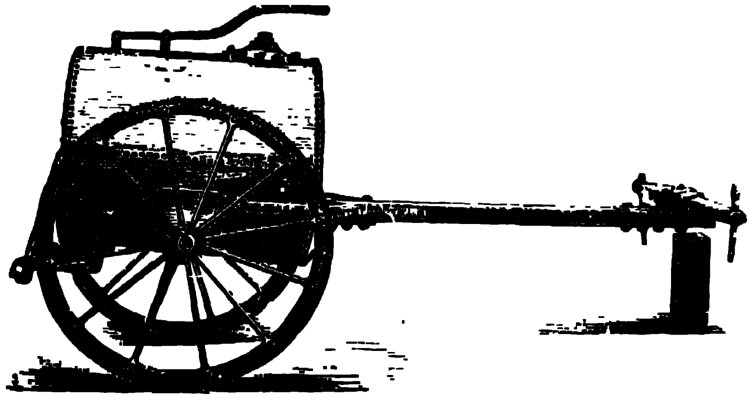
Night Soil Cart with Iron Wheels.



This illustration represents our improved Night Soil Carts. They are made of the best material throughout, and special attention is given in the construction to make every part as strong and at the same time as light as possible. To discharge the contents a pin is released from the cross bar shown in front of pan, which allows the pan to revolve on the axle. The Carts are provided with a double cover, which, with a little earth or sand placed between cover and plate, effectually prevents any objectionable smell from arising.

	Price,
75 gallon capacity	**Rs. 340-0**
110	**370-0**

Street Watering Cart.

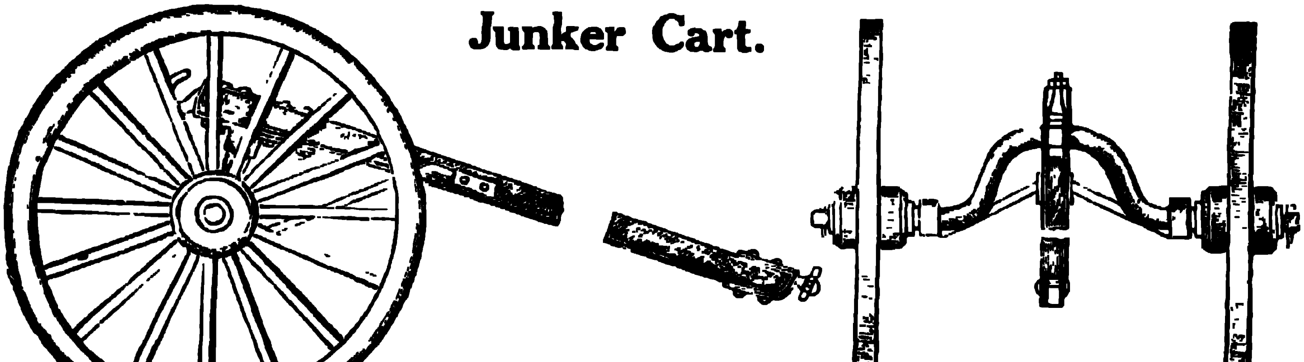


Made of a Cylindrical Wrought-Iron Tank 3 feet 6 inches diameter and 4 feet long, to hold 240 gallons, with manhole cover, outlet valve, lever and iron spray pipe.

The axles and attachments are of Wrought-Iron and the Wheels Wrought-Iron with Cast-Iron bosses.

Price, Rs. 540-0

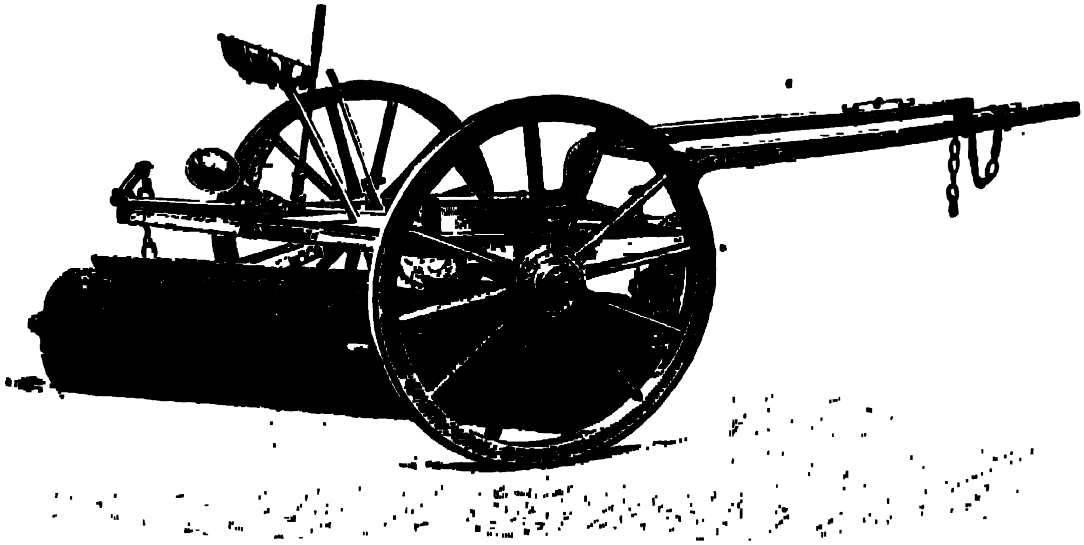
Junker Cart.



The above has been specially designed with a view to providing an easy means of transport for timber, parts of machinery, or other material of a heavy nature, and will be found to be a handy and efficient means of conveyance in cases where the roads are bad and material of this description has to be carried. The best seasoned wood is used in the construction and is bound with iron to give additional strength, thereby enabling it to stand the rough usage with which a cart of this kind is likely to meet.

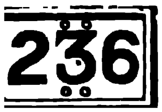
Prices on application.

Improved Road Sweeping Machine.



In this Machine the makers have succeeded in producing a light draught Sweeper of simple construction which can be easily managed and is well within the power of one horse or bullock. The frame is of iron and steel, and all the parts are designed with the view to lightness combined with strength.

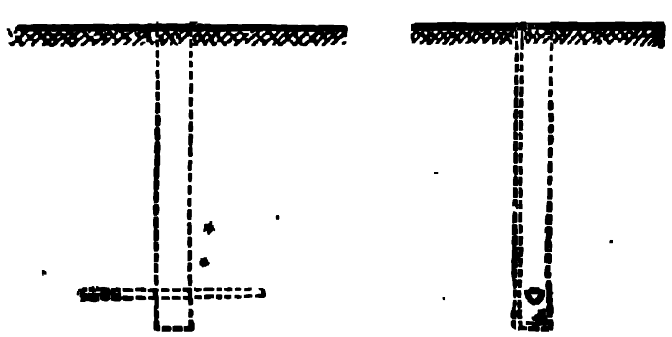
Price of Machine complete with W.-I. Brus. to Sweep a width of 6 ft. 6 ins., travelling wheels and shaft	**Rs. 900**
Spare Brushes	**" 150**



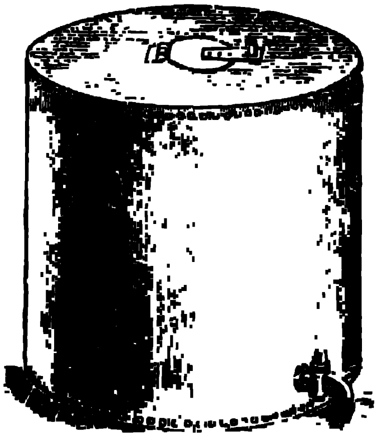
Mile Posts.

The Mile Post illustrated consists of a strong T. Iron Standard and Cast-Iron Figure-plate. The plate is 8 inches broad (the length varying according to the number of figures) and is secured to the Standard with countersunk bolts and nuts. The raised figures, which measure 5 inches, are cast in one with the plate and painted black on white ground. The Standards are 5 feet long and should be fixed in the ground to leave 3 feet above and 2 feet below the surface. Anchor Bars are provided as shown.

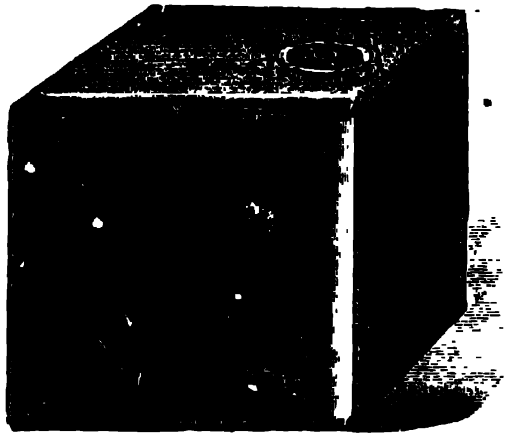
Prices on application.



Wrought-Iron Water Tanks.



Circular



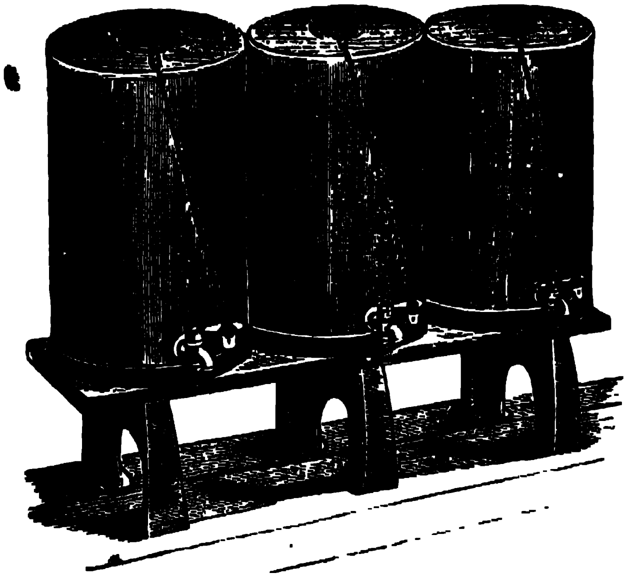
Square.

Price of 4-ft. cube, to hold about 400 gallons, painted red, sheets 16 G. thick. Each **Rs. 95-0**
Ditto ditto galvanized „ „ „ „ **„ 115-0**

We make Tanks of various dimensions, either circular, square or rectangular, and shall be pleased to submit estimates on application. We also supply Cast-Iron Tanks of any required dimensions, complete with Bolts and Nuts, Tie Rods, Cement, etc. They are fitted together in our shops and carefully marked for re-erection on reaching destination. All sizes made to order. For illustrations please see pages 332-336.

Heavy Galvanized Cisterns.

27-inch cube, to hold about 70 gallons ..	Each	**Rs. 75-0**
30 „ „ „ „ „ 100	„	**„ 92-0**
36 „ „ „ „ „ 170	„	**„ 180-0**



Engine-room Oil Tanks.

These Tanks are fitted complete with Chains and Locks.

Prices:

Set of Three,	50 gallons	Each	**Rs. 300-0**
„ „ „	100 „	„	**„ 400-0**

Prices exclusive of Stands.

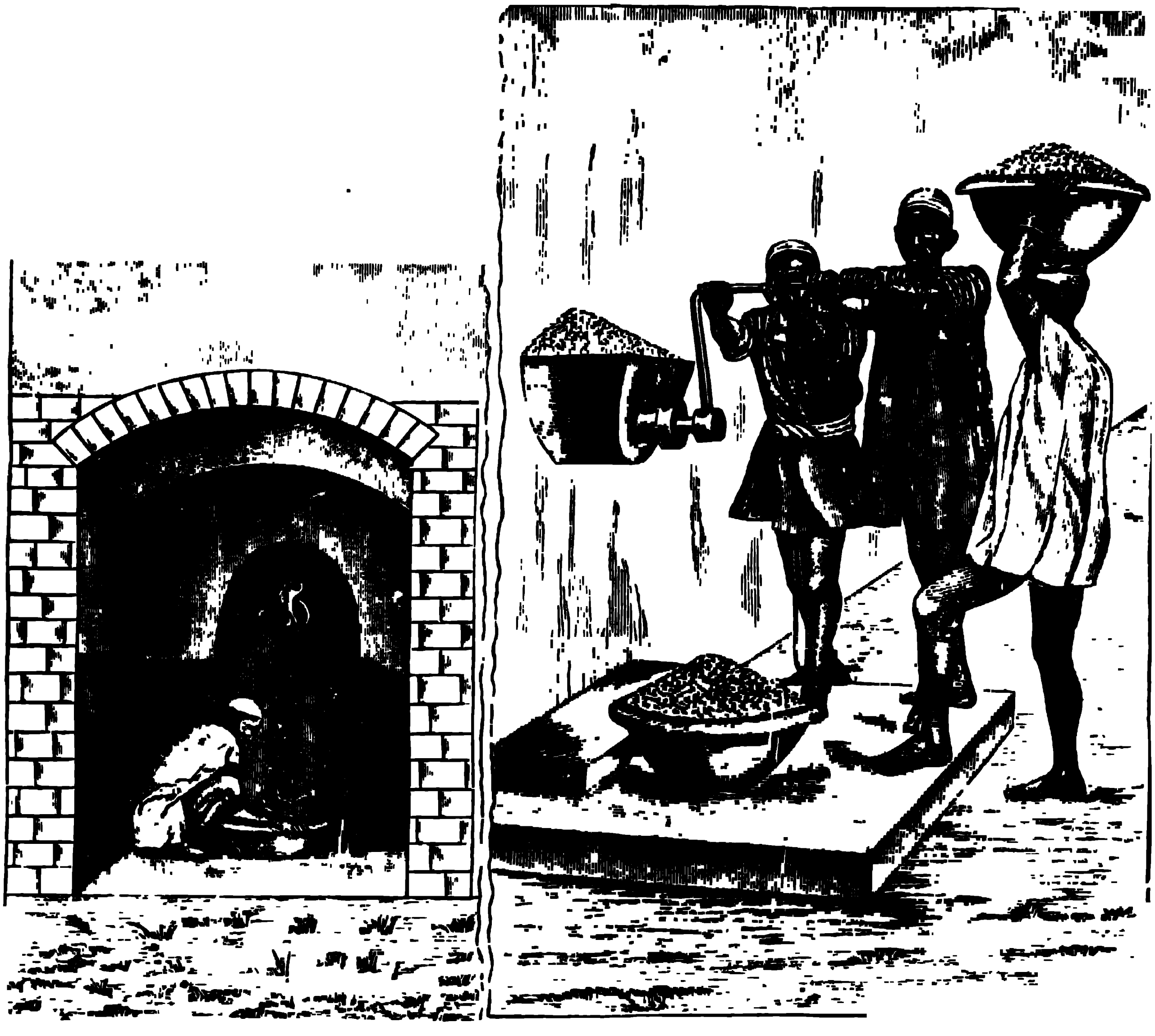
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

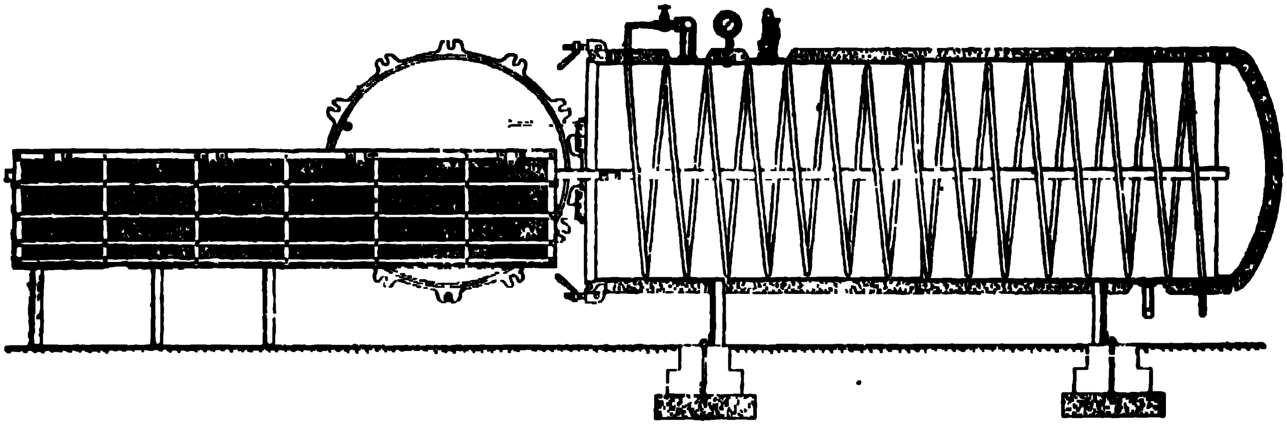
Donaldson's Patent Ejector.

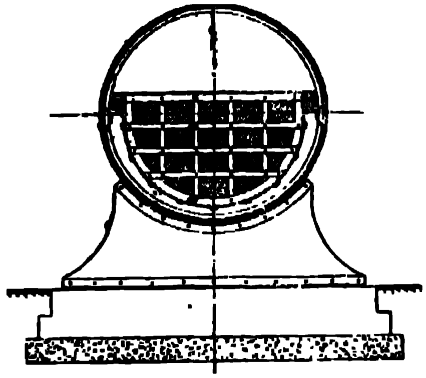
Fixed in Working Position.

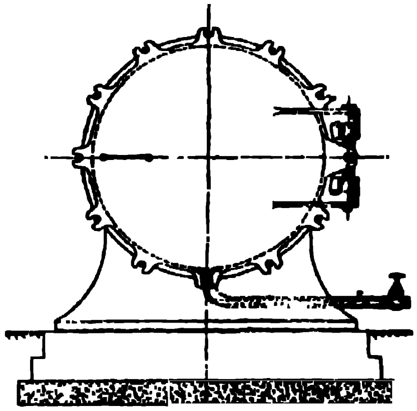


The illustration on the left shows an alcove and end of Ejector on outside of Jail Wall, showing the reception of the pugged material for conveyance to the garden trenches, whilst the other illustration shows the hopper and method of feeding the appliance from inside the Jail.

Disinfecting Boilers.







The above illustrations indicate a type of High-Pressure Steam Disinfector of large capacity, of which we have manufactured and supplied a considerable number which are in daily use in various parts of India. The diameter of the shell is 4 feet and the length about 12 feet.

The articles to be disinfected are placed in the semi-circular steel cage which is then run forward into the main shell, a portion of the rail being removable to allow the massive cast-iron door to be closed and bolted up. Steam is then admitted to the Disinfector, either through the coil, or directly into the shell as may be required. In the former case the articles are subjected to a dry heat, and in the latter to a wet heat. A suitable arrangement of valves and drain pipes is provided, together with a Safety Valve and a Pressure Gauge.

Steam may be provided from any existing boiler plant if this is available, otherwise a separate boiler must be installed. With many of our Disinfectors we have supplied special boilers of our own manufacture. These are fitted with all the usual boiler mountings, such as Dead Weight Safety Valves, Pressure Gauges, Gauge Glasses, Injectors, Stop Valves, Fire Doors, Fire Bars, etc., and are up to the requirements of the various Boiler Commissioners in India.

The whole plant is tested under steam before being despatched from our Works. Fully detailed drawings are supplied to enable the purchaser to build the necessary boiler flues and foundations.

A further type is also manufactured embodying the suggestions of a leading Public Health Officer. In this, doors are furnished at both ends, and the Disinfector is served from one room and discharged into another to prevent the possibility of contamination.

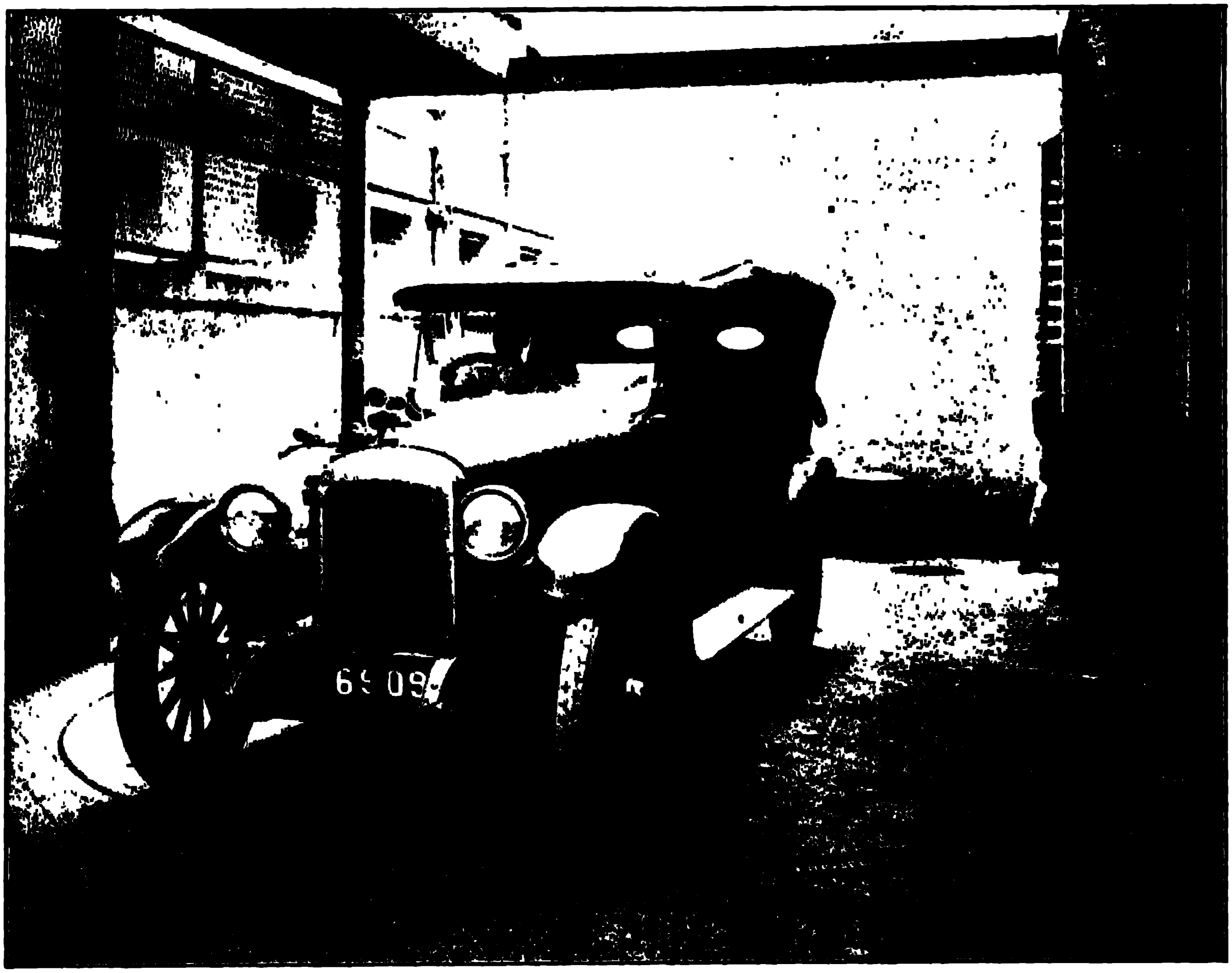
Full particulars and prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Motor Car Turntables.



The illustration shows one of a number of Motor Car Turntables, manufactured by us, and at present in use in Calcutta.

In collaboration with a prominent Architect of the City we designed these Turntables in an endeavour to relieve the congestion of traffic in garaging cars in the confined spaces available in the business quarters, and we are pleased to say that they have met with considerable success so that we have received a number of repeat orders.

The Turntable is made up of a strong steel underframe with a wooden decking, the whole rotating on steel rollers, which enables them to be manipulated with great ease.

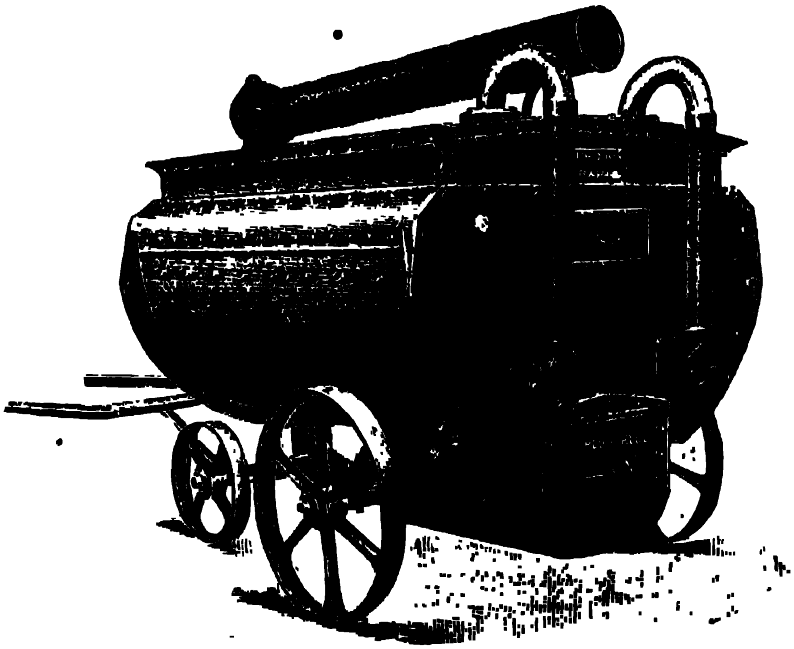
We shall be pleased to submit designs and estimates for any type of Turntable on receipt of the necessary details.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

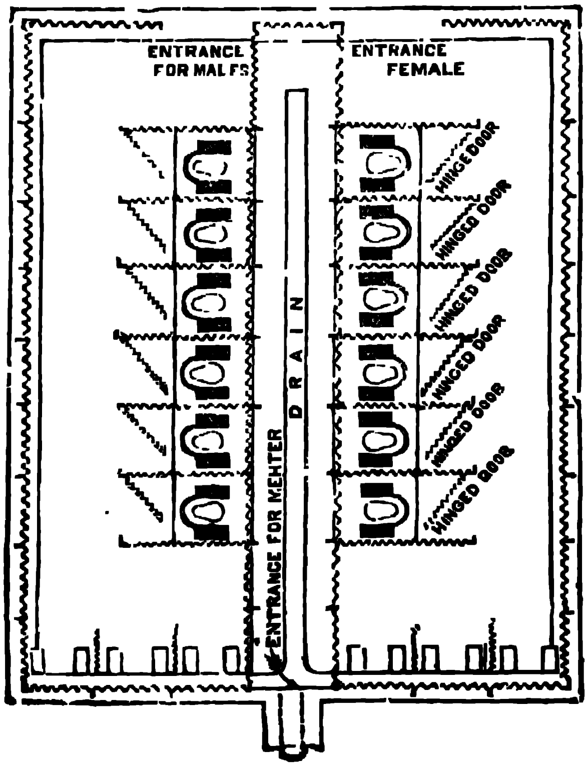
The "Phoenix" Rapid Tar, Pitch and Bitumen Boilers.

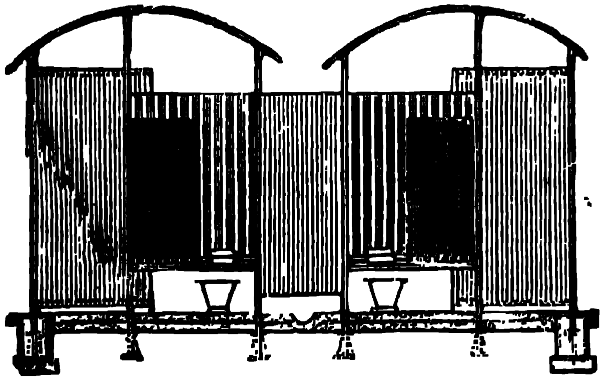


The "Phoenix" Tar Boiler illustrated above is a design to which we have supplied a number for the Calcutta Corporation. The Boilers have a capacity of 160 gallons each. They are fitted with gas tubes for consuming the gases given off by the tar thereby effecting considerable economy in fuel

Price, Rs. 1,250-0.

Railway Station Latrine.





This illustrates a 12-seated Latrine suitable for Railway Stations, Works, etc. We have made a number of these for Stations on State and other Railways.

Estimates on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

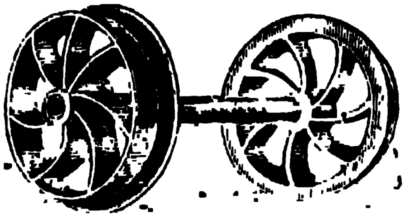
Wheels and Axles.

Suitable for all Classes of Wagons, Trucks and Trolleys.

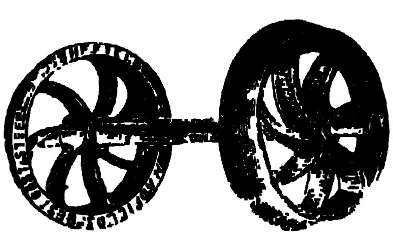
To suit constituents who find it more convenient to construct their own boxes and frames of wagons, we keep a large stock of wheels, axles and axle boxes, and can supply wheels of either steel or cast-iron to suit 18 inches to metre gauge railways.

In ordering, please state clearly the gauge of rail, and whether the axles are to have inside or outside bearings.

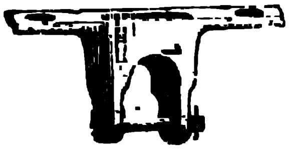
Wheels on Axle.
For Inside Bearings.



Wheels on Axle.
For Outside Bearings



Cast-Iron Pedestals.



For Bearings 1½ ins. diam.	.. .	**Price, Rs. 3 each.**
For Bearings 1¾ ins. diam.	. .	**Price, Rs. 4 each.**

Cast-Steel Wheels and Axles.

Suitable for Coal Tubs, Tipping Wagons, or other Rolling Stock as used on Light Railways.

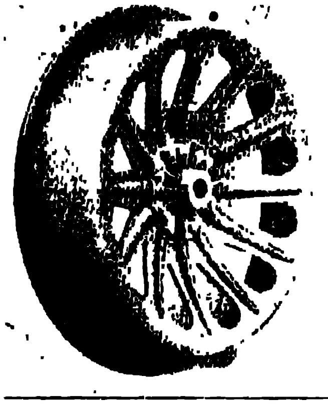
	Rail Gauge		
	2 Feet.	Metre.	Broad.
Four Wheels, **12 ins.** diameter and 2 Axles, 1¼ ins. diameter for **inside** bearings . .. .. **Rs.**	38 0	..	
Four Wheels, **12 ins.** diameter and 2 Axles, 1¼ ins. diameter for **outside** bearings .. .. **Rs.**	38 0	..	
Four Wheels, **14 ins.** diameter and 2 Axles, 2 ins. diameter for **inside** bearings .. .. . . **Rs.**	..	105	125
Four Wheels, **14 ins** diameter and 2 Axles, 2 ins. diameter for **outside** bearings . .. .. **Rs.**	..	115	135
Four Wheels, **18 ins.** diameter and 2 Axles, 2¼ ins. diameter for **inside** bearings .. .. **Rs.**	..	175	200
Four Wheels, **18 ins.** diameter and 2 Axles, 2¼ ins. diameter for **outside** bearings .. .. .. **Rs.**	..	195	220
Four Wheels, **18 ins.** diameter and 2 Axles, 3 ins. diameter for **inside** bearings .. .. **Rs.**	..	210	250
Four Wheels, **18 ins.** diameter and 2 Axles, 3 ins. diameter for **outside** bearings .. .. .. **Rs.**	..	230	275

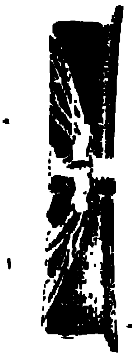
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

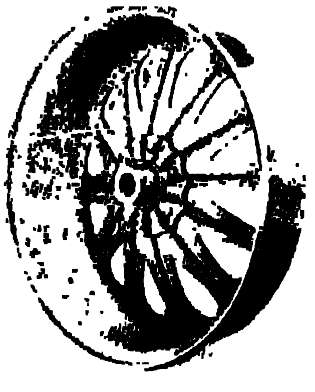
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Improved Pressed Steel Trolley Wheels.







The wheel is the most important feature of Hand and Push cars because it receives more wear than any other part, and is, therefore, the greatest item in the maintenance of the Car.

One of the principal faults of all pressed steel wheels hitherto invented is the tendency to quickly wear through in the throat of the flange, due to the thinness of metal at this point. The flange then breaks off, necessitating the discarding of the wheel.

By the use of special machinery, the metal in the wheel is gathered so as to increase its thickness about $\frac{3}{16}$ of an inch in the throat of the flange. In other words, the metal being $\frac{1}{8}$ of an inch thick in the thread, is nearly double that thickness in the flange and at the throat.

The plates are made of toughened homogeneous open hearth steel, sheared into circles, shaped at proper heat under hydraulic pressure, then reheated and run through a finishing machine, which gathers and increases the thickness of metal in the flange as described above. From the finishing machine the wheel passes at red heat into another hydraulic press holding male and female dies that are used for sizing purposes so that when completed all wheels are exactly the same diameter and circumference. Therefore, it is not necessary to grind or true the wheel in a lathe, which destroys the hardened skin of the steel and impairs its durability.

The method of finishing the wheels by rolling makes the metal harder than the original plate and the tensile strength and wearing qualities are increased. The metal is compressed in each operation, making it more dense and strong, while in other methods of manufacture the metal is drawn or stretched, which tends to open the fibre and lessen the durability.

The hub and the hub flange are pressed into place and riveted cold under hydraulic pressure.

The web is given considerable more dish toward the centre, which, with the deeper and stronger corrugations, greatly increases the weight-bearing qualities and makes a much better and stronger hub-fit.

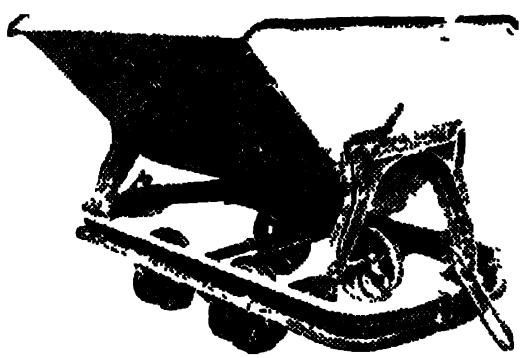
Diameter of Wheel. Ins.	Turned Diam. of Core. Ins.	Thickness of Rim. Ins	Weight of Wheel. Lbs.	Price, each, Rs.
20	1$\frac{3}{16}$	$\frac{3}{16}$		40 0

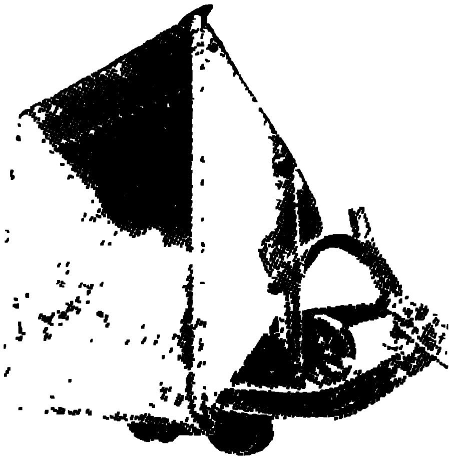
Fitted to Tubular Axles 1$\frac{5}{8}$ ins. diameter.

Set comprising of	For Metre and Standard Gauges.
Four wheels and 2 axles	Rs. 220 per set.
Four wheels and 2 axles and fitted with Gun-metal Cod Blocks	„ 285 „ „

Spare Tubular Axles 1$\frac{5}{8}$ ins. diameter, Rs. 10-8 each.

Double Tipping Wagons.





Specification.

Capacity 27 Cubic Feet.

Truck Gauge 24 inches.

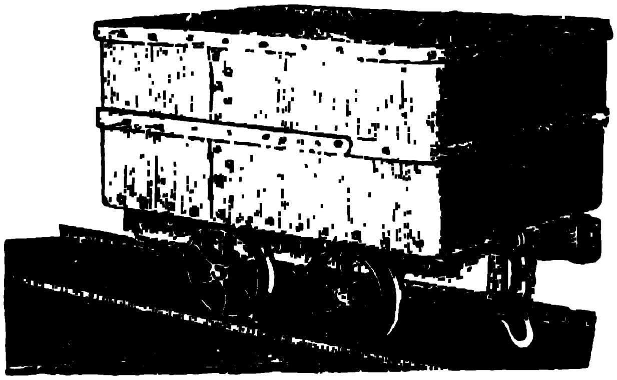
Body.—" V " shaped standard size of ⅛ in. steel plates, securely riveted up with inside 1½ ins. angle steel framing, having corner reinforcements, and fitted with angle stiffeners on the sides. Rocker angles securely fixed to end plates and resting on cradles.

Frames.—Of 4 steel channels, having rounded ends protected by pressed steel plates, forming central buffers, with link and pin coupling. Frame tied at centre and fitted with hook for brake pole.

Running Gear.—Cast-Steel Wheels of best quality 12 in. diam. on tread, hydraulically pressed on to 1¾ ins. mild steel axles at a minimum pressure of 12 tons. Journals in self-oiling roller bearings. **Price, Rs. 137-8.**

Prices of End Tipping Wagons and other sizes on application.

Steel Coal Tubs.



These Coal Tubs have mild steel bodies 4 ft. 0 in. by 3 ft. 0 in. by 2 ft. 6 ins. and a capacity of 30 cubic feet. The underframes are of timber and are mounted on cast-steel wheels 12 ins. diam., with 1½ ins. axles and cast-iron cod blocks.

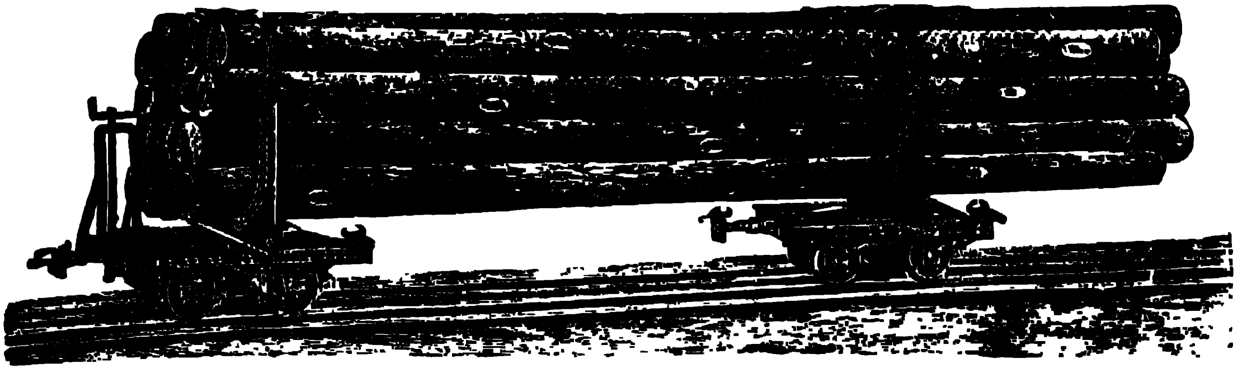
Truck Gauge, 24 inches.

Price, Rs. 155-0 each.

Brick Truck.

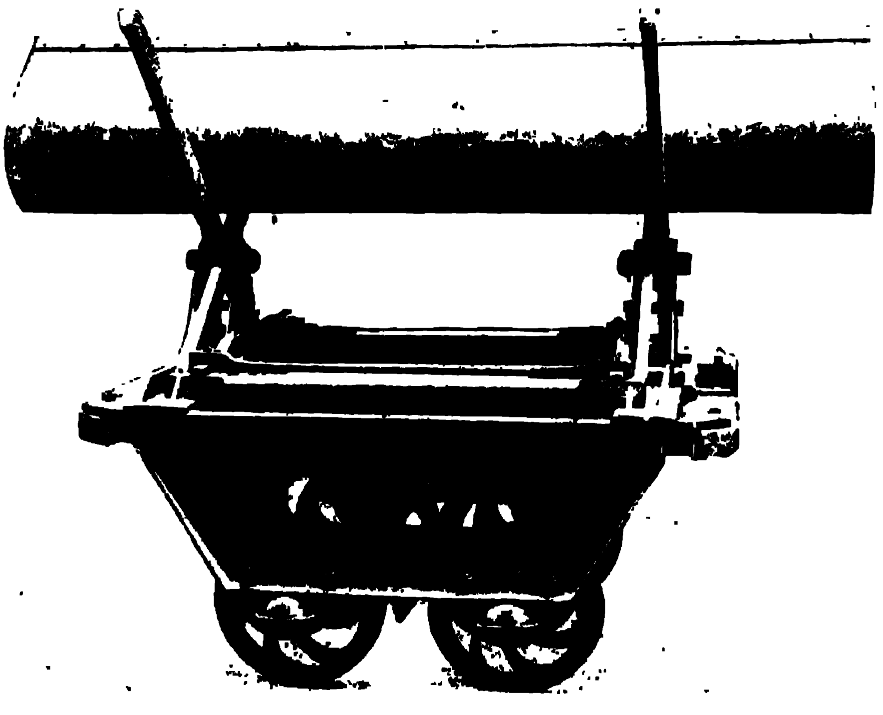
Platform 6 ft. by 4 ft. of timber. Under-carriage of timber, on Steel Axles, Cod Blocks and Cast-Steel Wheels, 12 ins. diameter. **Price, Rs. 135-0** each.

Timber Trucks.



For the carriage of long timber, pipes, etc., the above illustrated bogies are used in pairs. The bogies are fitted with revolving bolsters, drop stanchions, hooks and chains for securing the timber, and can be made to suit any rail gauge.

Works and Jetty Wagons.



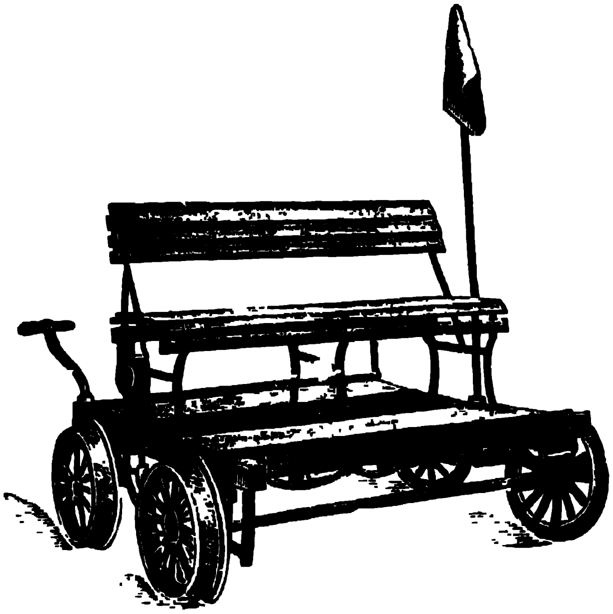
This is an all steel wagon of simple construction suitable for Works or Jetty use for carrying steel bars, etc. The platform is raised to a convenient height for handling the materials.

Salt Trucks.

Manufactured of steel throughout, securely riveted up with angle steel framing and fitted with hinged doors. Frames of steel channels and mounted on four cast-steel wheels.

40 maunds capacity 30 ins. rail gauge. **Price, Rs. 400-0.**

Light Running Inspector's Trolley.



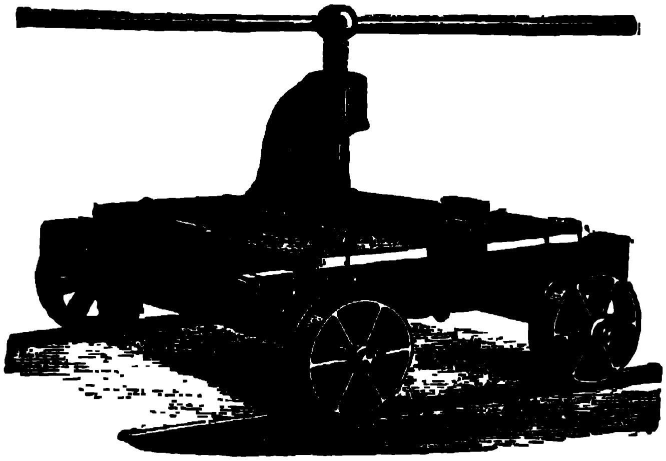
The illustration shows a design of light running passenger trolley for district, resident, signal and assistant engineers, traffic officers and block signal and permanent-way inspectors, etc., etc.

The trolley is fitted with teakwood frame, powerful hand brake, gun-metal bearings, propelling handles and sockets for the handles at both ends to enable the trolley to be pushed in either direction. The **Reversible Seat** permits the officer or officers carried to face the direction in which they are travelling all the time without removing the trolley from the rails.

A special feature of the construction is the light pressed steel wheels and solid drawn steel tubular axles The design of the trestles gives considerable resilience to the seat; but, if desired, springs can be fitted at a small extra cost.

Price, complete for broad gauge rails, **Rs. 675-0.**

Platelayer's Rail Press Trucks.



These are made of any gauge, particulars of which should be given and also a sketch showing the section of the Rail. Price includes Rail Setting Press of any gauge complete with Trolley.

No.	To Bend Steel Rails up to	Approx. Weight.	**Price.**
	50 lbs per yard.	9 cwt.	**Rs. 380**
	90 „ „	12½ „	**„ 525**

Steel Wire Ropes.

W. B. Brown & Co. (Bankhall), Limited.

For Winding, Sinking, Hauling, Aerial Ropeways, Cableways, Suspension Bridges, Steam Ploughing, Transporters, Coal-handling Towers, Shipping, etc.

The quality of the steel used is clearly the most important feature in the construction of these wire ropes. Greater care is not possible than that exercised in the selection of Brown's materials Every wire used is minutely tested for breaking strain, close attention being given to the torsion and flexion tests, representing the ductility of the Wire and therefore its REAL wearing qualities.

All Winding and Hauling ropes are constructed on Brown's *Improved* " Lang's Lay " method, in which the tendency to curl or snarl has almost disappeared. Mild Plough Steel Ropes can confidently be recommended to users for haulage purposes

They are of a very tough nature and exceptionally regular in mechanical tests, but the flexion and torsion tests are considerably above the standard in general use for haulage purposes.

Breaking Strains.—All breaking strains given on the following pages are calculated on the aggregate breaking strain of the individual wires composing the ropes and are tons of 2,240 lbs

Particulars to be considered when ordering a Rope.

Length of Rope.
Size, *i.e.*, diameter *or* circumference.
Construction of Rope..............Strands of.............Wires each
Main Core, Hemp *or* Wire.
Lay, *i.e.*, Ordinary Lay *or* Lang's Lay.
(Lang's Lay Ropes are generally used for Mining Work.)
Working Load, *i.e.*, Weight of Tubs, Mineral, and Rope, Plus Friction.
Breaking Strain.
Diameter of Drum.
Diameter of Pulley.
Speed per Minute.
Angle of Drum and Pulley (if for winding purposes).
Gradient (if for haulage purposes).

Ropes with wire main cores should be used in cases where:—
Intense heat is experienced
Where the rope is overloaded and the additional strain obtained thereby is a necessity
or
Where heavy grips are used which would damage a rope with a hemp main core.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

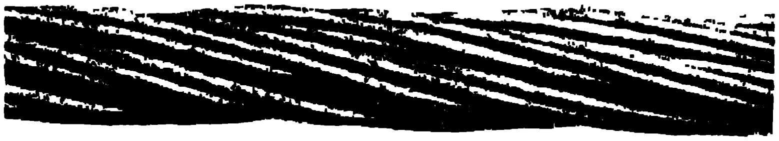
Steel Wire Ropes.

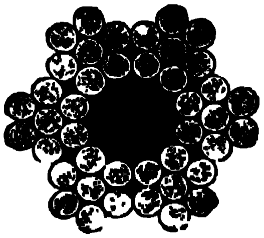
Lang's Lay.

Winding and Hauling Ropes.

6 Strands of 7 Wires each.

Hemp Main Core.





Lang's Lay Wire Ropes.—The success of these Ropes is so well known that it is needless to do more than to point out that the peculiarity of construction in this old established and most successful Lang's Lay Wire Rope is that the wires in the strands, and the strands in the rope, are both laid in the same direction, thus rendering the rope capable of bearing great friction and wear.

Circum. of Rope	Diam. of Rope.	Approx. weight per 100 ft.	BEST PATENT STEEL. Basic 80/90 tons per square inch.		SPECIAL IMPROVED PATENT STEEL. Basic 90/100 tons per square inch.		BEST PLOUGH STEEL. Basic 100/110 tons per square inch.		SPECIAL IMPROVED PLOUGH STEEL. Basic 110/120 tons per square inch		EXTRA SPECIAL IMPROVED PLOUGH STEEL Basic 120 tons per square inch.	
			Actual Breaking Strain.	Price per cwt	Actual Breaking Strain.	Price per cwt	Actual Breaking Strain.	Price per cwt	Actual Breaking Strain.	Price per cwt	Actual Breaking Strain.	Price per cwt.
Ins.	Ins	Lbs.	Tons.	Rs.	Tons.	Rs	Tons.	Rs.	Tons.	Rs.	Tons.	Rs.
1⅝	½	47	8·4	58 0	9·4	60 8	10·5	70 8	11·4	85 0	11·9	96 8
1¾	9/16	54	10·0	52 0	11·1	56 0	12·3	65 0	13·5	79 8	14·1	91 0
1⅞	.	60	11·5	52 0	12·7	56 0	14·0	65 0	15·3	79 8	15·9	91 0
2	⅝	72	13·0	51 0	14·6	55 0	16·2	61 8	17·7	76 0	18·5	...
2⅛	11/16	80	14·6	51 0	16·3	55 0	18·0	61 8	19·7	76 0	20·6	.
2¼		87	16·2	50 0	18·1	54 0	20·0	59 8	21·9	74 0	22·8	. .
2⅜	¾	97	18·3	50 0	20·4	54 0	22·6	59 8	24·8	74 0	25·8	
2½	13/16	107	20·1	49 0	22·5	51 8	24·8	57 0	27·2	71 8	28·4	.
2⅝		120	22·5	49 0	25·1	51 8	27·7	57 0	30·3	71 8	31·6	
2¾	⅞	132	24·9	46 8	27·8	49 0	30·7	55 0	33·7	69 8	35·1	..
2⅞	. .	140	26·5	46 8	29·6	49 0	32·7	55 0	35·8	69 8	37·4	..
3	15/16	154	29·1	46 8	32·6	49 0	36·0	55 0	39·4	69 8	41·2	...
3⅛	1	168	31·3	46 8	35·0	49 0	38·7	55 0	42·4	69 8	44·3	...
3¼	...	184	34·3	46 8	38·2	49 0	42·3	55 0	46·4	69 8	48·3	...
3⅜	1 1/16	196	36·7	46 8	41·0	49 0	45·3	55 0	49·6	69 8	51·8	...
3½	1⅛	217	39·8	47 0	44·5	50 8	49·3	56 0	53·9	...	56·3	...

Prices for Acid Steel and Special Acid Steel also for other sizes on application.

Actual strains are the test breaking load for the completed rope subject to a tolerance of 5 per cent. below.

For Wire Main Cores add 1/9th to the weights: Breaking Strains unaltered.

Stocked in 1,000, 1,500, 2,000 and 5,000 feet coils.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

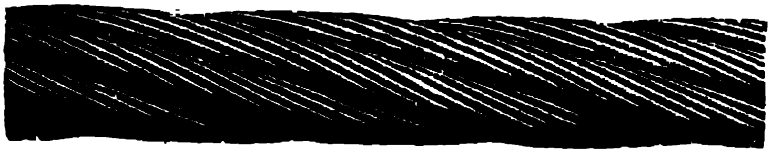
Steel Wire Ropes.

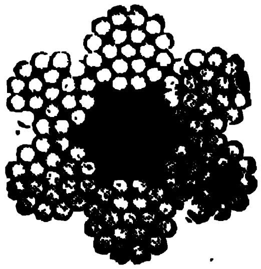
Lang's Lay.

Flexible Winding and Hauling Ropes.

Compound Installation.

6 Strands of 19 Wires each (12 over 7).
6 Strands of 27 Wires each (15 over 9 over 3)
6 Strands of 37 Wires each (18 over 12 over 7).
Hemp Main Cores.





Suitable for Cranes, Hoists, Lifts, etc.

Circum. of Rope.	Diam of Rope.	Approx. weight per 100 feet for 6/19 construction.	"A" FLEXIBLE 6/19 CONSTRUCTION. Best Pat Steel Basic 80/90 tons per square inch. Actual Breaking Strain.	Price per cwt	Best Plough Steel Basic 100/110 tons per square inch. Actual Breaking Strain	Price	Approx. weight per 100 feet for 6/27 and 6/37 construction	"B" FLEXIBLE 6/27 CONSTRUCTION. Best Patent Steel Acid 80/90 tons per square inch. Actual Breaking Strain.	Price per cwt	Best Plough Steel Acid 100/110 tons per square inch. Actual Breaking Strain.	Price per cwt.	"C" FLEXIBLE 6/37 CONSTRUCTION. Best Patent Steel Acid 80/90 tons per square inch. Actual Breaking Strain.	Price per cwt	Best Plough Steel Acid 100/110 tons per square inch. Actual Breaking Strain.	Price per cwt.
Ins.	Ins	Lbs.	Tons.		Tons	Rs.		T			Rs		R	Tons.	Rs.
1¼	..	25	4·3	102	5·2	109	25	4·1	154	5·5	162	3·9	190	4·8	198
1⅜	7/16	30	4·9	101	6·1	109	30	5·3	135	6·5	143	4·7	171	5·8	179
1½	..	36	6·0	86	7·4	94	36	6·2	120	7·6	128	5·8	154	7·1	162
1⅝	½	43	7·2	77	9·0	85	43	7·2	120	8·9	128	6·8	135	8·4	143
1¾	9/16	50	8·1	77	10·1	85	50	8·2	101	10·2	111	8·0	120	9·9	128
1⅞	..	58	9·5	66	11·8	74	58	10·0	101	12·3	111	9·3	120	11·4	128
2	⅝	66	11·1	66	13·7	74	66	11·2	94	13·9	102	10·7	103	13·2	111
2⅛	11/16	74	12·1	61	15·0	68	74	12·6	94	15·5	102	12·1	103	15·0	111
2¼	..	84	13·9	61	17·2	68	84	13·9	83	17·2	91	13·8	94	17·0	102
2⅜	¾	92	15·7	61	19·4	68	92	15·5	83	19·0	91	14·5	94	18·0	102
2½	13/16	102	17·0	55	21·1	67	102	17·0	78	21·0	86	16·2	94	20·1	102
2⅝	..	112	18·4	55	22·7	67	112	19·4	78	24·0	86	18·0	83	22·5	91
2¾	⅞	123	20·5	55	25·3	67	123	21·1	78	26·2	86	19·9	83	24·7	91
2⅞	..	135	22·7	50	28·0	62	135	23·0	78	28·1	86	21·9	83	27·1	91
3	15/16	154	25·8	50	31·9	62	145	24·8	72	30·7	80	24·1	78	29·8	86
3⅛	1	168	27·5	50	33·9	62	159	26·8	72	33·1	80	26·2	78	32·4	86
3¼	..	184	30·0	48	37·1	59	172	29·8	72	36·9	80	27·4	78	33·8	86
3⅜	1 1/16	196	32·7	48	40·4	59	185	32·0	72	39·5	80	29·7	78	36·7	86
3½	1⅛	217	35·5	48	43·8	59	198	34·2	67	42·2	75	32·2	72	39·7	80

Prices for other sizes on application.

If Wire Main Core add 1/9th to the approximate weight. Breaking **Strain remaining unchanged.**

The actual Breaking Loads are subject to a tolerance of 5 per cent. below.

The approximate weights are the same for "B" Flexible and "C" Flexible.

Stocked in 1,000, 1,500, 2,000 and 5,000 feet coils.

Steel Wire Ropes.

Flexible Galvanized Best Patent Steel Wire Ropes.

90-Ton Strain.

For Hawsers, Running Gear, Etc.

		FLEXIBLE CONSTRUCTION.					
		6 × 12.			6 × 19.		
Circum. of Rope.	Diam. of Rope.	Weight per Fathom.	Aggregate Breaking Strain.	Price, per cwt.	Weight per Fathom.	Aggregate Breaking Strain.	Price, per cwt.
Ins.	Ins	Lbs	Tons	Rs.	Lbs.	Tons.	Rs
1⅛	⅜	0·84	2·6	92	1·26	4·0	92
1½	....	1·50	4·8	76	2·16	7·3	76
1⅞	9/16	2·10	6·6	72	3·00	9·8	72
2	⅝	2·70	8·9	61	3·96	13·4	61
2½	13/16	4·20	13·7	53	6·12	20·6	53
3	15/16	6·00	19·5	52	8·70	29·3	52
3½	1⅛	8·40	27·1	50	11·88	40·6	50
4	...	10·98	35·9	48	15·78	53·8	48
4½	....	11·04	45·9	45	19·98	68·9	45

Prices for other sizes and 6 by 24 and 6 by 30 construction on application.

Notes on the use of Flexible Steel Wire Ropes.

Flexible Steel Wire Ropes are suitable for working upon pulleys of very small diameter, but it is important that the drums or pulleys should be as large as practicable.

It is important that the pulley should be turned out in the groove of an exact radius to fit the rope.

A very damaging effect upon the ropes, which frequently occurs, is produced by working a pulley which is too narrow in the groove and does not allow the rope to work fairly upon the tread. The consequence is that the rope is pressed out of shape, and it is so severely jammed in the groove that the wires are damaged, broken, and torn out of the rope in dragging it out of the groove which is too small to contain it.

An evil of lesser extent, but of great importance, is where a rope is put to work upon a pulley much too wide for it. In this case the individual wires come into contact with the bottom of the groove, which has the effect of producing a line of broken wires all along the circumference, and consequently a false groove is cut by the rope.

Another evil which frequently occurs is in putting a new rope to work upon a pulley where the old rope has cut its own groove, so that when the new rope is put on the wires are damaged by its working upon the edges of a false groove caused by its predecessor.

The drums for crane ropes should, if possible, be lagged with wood, which is preferable to the wire working upon a plain iron surface.

For modern cranes and hoists working at increased speeds it is found necessary to use pulleys of greater diameter, and we recommend that the following rule be observed after deciding upon the circumference of a rope required:—

For "A" Flexible construction— drum and pulley seven times the ropes circumference.
" "B" " " " " " six " " " "
" "C" " " " " " five " " " "

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Wire Ropes.

Heavy All-Wire Cables.

For Suspension, Cantilever, and General Bridge Work.

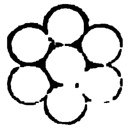
Of spirally-laid solid strand installations, or constructed with seven strands of seven or more wires in each; of special high-class Plough or Improved Patent Crucible Steel, plain or galvanized.

Diameter of Rope. Ins.	Number of wires.	Breaking strain. Tons.	Approximate weight per Fathom Lbs.
1	37	54	12·5
1⅛	37	68	15·6
1¼	48	84	19·2
1⅜	61	103	23·6
1½	75	122	27·9

Particulars of larger sizes and Prices on application.

Cage Guide Ropes.

Special Mild Steel.—7 Rods.



The rods are supplied from either drawn or rolled material, electrically or hand-welded, and from the longest single length of rod without weld obtainable. The material is produced in 300 lb pieces, which obtains the minimum number of welds in a long Conductor or Guide

Circumference of Rope. Ins.	Diameter of Rope. Ins.	Approximate weight per Fathom Lbs.	Price, per cwt. Rs.
3¼	1	14	40-0

Prices for other sizes on application.

Stocked in 300, 350, 400, 600, 700 and 800 feet coils.

Galvanized Flexible Steel Wire Cords.

With 7 Hemp Cores.

Circumference of Cord. Ins.	Diameter of Cord. Ins.	Galvanized Mild Steel		Galvanized Patent Steel.	
		Combination Strands & Wires.	Price per 100 feet. Rs.	Combination Strands & Wires.	Price per 100 feet. Rs.
11/16		6×9	7-8	6×9	8-8
¾	¼	6×9	8-0	6×9	9-0

Prices for other sizes on application.

Special Wire Ropes.

For Bridges, Oil Well Ropes for Drilling, Cleaning Out and Pumping, Sand Lines, Baling Lines, Casing Lines, Tea Shoots, Steam Ploughing, Logging, etc., etc., also Locked-Wire Ropes.

Particulars and Prices on Application.

Attachments for Wire Ropes.

We can supply special Capples, Sockets, Shoes, etc., or attachments of any type to suit special requirements but we recommend the following as the simplest and most reliable.

Improved Conical Steel Sockets.

For the load end of all ropes we recommend the Improved Solid Steel Sockets as illustrated below, which are guaranteed perfectly safe and more than equal to the full breaking strength of ropes to which they are attached. There is always more or less danger in adapting an eye on a thimble attachment, from the fact that there is only a short splice to depend upon, and this is undoubtedly the weakest part of the rope, and which is often rendered unsafe in work by twisting and rough usage.

Prices for all sizes on application.

Improved Off-take Sockets.

For Coupling and Uncoupling Haulage and other Steel Wire Ropes.

(Blackett's Patent.)

For underground haulage, it is necessary, especially at the ends in the main and Tail Rope System, to have a rapid and easy method of coupling and uncoupling the rope ends, and interpose a variety of disconnecting contrivances along with a swivel to provide against any spin or twist in the rope. All this has been very bulky and objectionable where the rope was required to lie evenly on a drum.

The improved off-take Sockets combined these requirements in a compact form and has been introduced in many Collieries with considerable success.

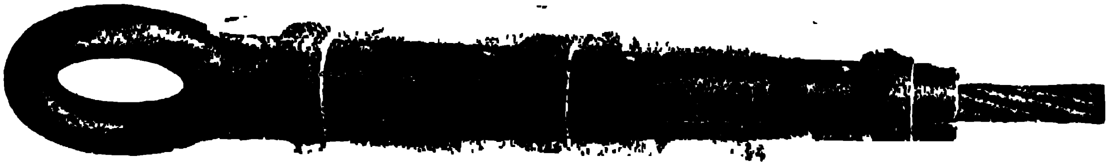
They are manufactured of special manganese Cast-Steel, with either straight or curved slots for the detachable end as preferred.

These Patent Couplings are suitable for all Types of Haulage, and are supplied at the following prices:—

Suitable for ½ in., ⅝ in. and ¾ in. diam. Ropes and intermediate sizes	**Rs. 18-8 per set.**
Suitable for ⅞ in. diam. Ropes ...	**„ 25 0 „ „**

Attachments for Wire Ropes.

Capple or Socket with Rings.



The Capple or Socket with rings for Winding Ropes is suitable either for ordinary Round Wire Ropes or for Locked Coil Wire Ropes.

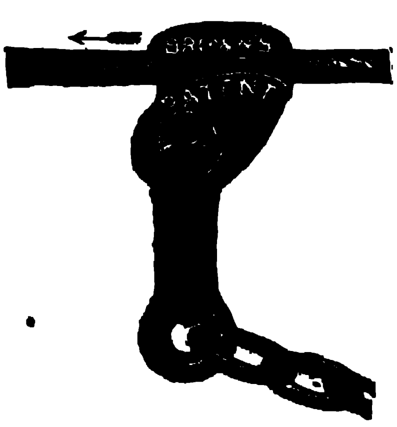
½ in. Socket with Rings	Rs 40 8 each	1⅛ ins Socket with Rings	Rs. 139 each
⅝ „ „ „ „	„ 46 0 „	1¼ „ „ „ „	„ 162 „
¾ „ „ „ „	„ 58 0 „	1⅜ „ „ „ „	„ 255 „
⅞ „ „ „ „	„ 81 0 „	1½ „ „ „ „	„ 278 „
1 „ „ „ „	„ 116 0 „		

Galvanized Thimbles.

For 1, 1⅛, 1¼ ins.	Rope ..	Rs	0 3 3 each	For 3½ in	Rope		1 11 0 each
„ 1⅜, 1½, 1⅝, 1¾ ins	„ ..	„	0 4 6 „	„ 3⅝, 3¾ ins			1 15 6 „
„ 2, 2¼ ins.	„ ..	„	0 7 6 „	„ 4¼ in			2 4 0 „
„ 2⅜ ins.	„ ..	„	0 12 0 „	„ 4½			3 6 0 „
„ 2½, 2¾, 3, 3⅛ ins.	„ ..	„	1 2 0 „	„ 4			4 4 0 „
„ 3¼ ins	„ ..	„	1 6 6 „				

"Bankhall" Patent Haulage Clips.

A reliable Automatic Clip of the Finest Malleable. For Over Tub Systems.



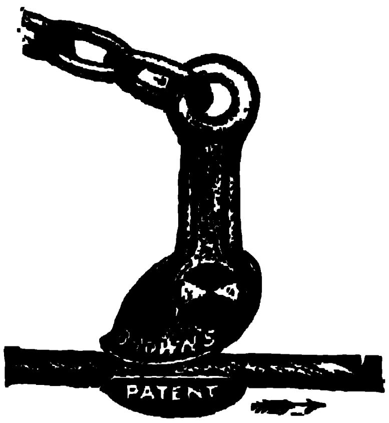
The inconvenience and danger attending the lashing system is avoided.

The Clip is provided with interchangeable leverage.

Simple, light, and strong, does not kink the rope or slip, whether before or behind tubs is self-locking, passes over drums or pulleys with ease, adaptable to continuous or endless ropes, or intermittent haulage, suitable for any gradients, takes three full tubs on steep inclines.

Sizes, ⅝ to 1 in.

Price, each Rs. 10.



CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS.

RANGOON, MADRAS,
BOMBAY, LONDON.

Best Toughened Cast-Steel Rollers and Frames.

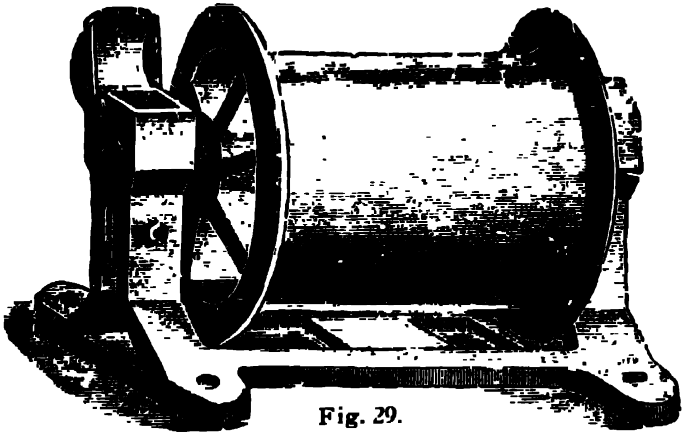


Fig. 29.

For Steel Haulage Rope Lines.

These Rollers and Frames are very simple, can be easily fixed in position, and when the grease box is filled with Lubricant, no attention is required for several weeks. **The Roller, Frame and Spindle are of the best cast-steel;** very strong and most durable. The Roller is balanced for working properly; when worn out it can be replaced in a few minutes.

Pattern No.	Dia. of Roller on body.	Over Flanges.	Length of Roller over Flanges.	Extreme Height Overall.	Length of Frame.	Weight
29	5⅛ ins.	6¼ ins.	11 ins.	6⅞ ins.	14⅛ ins.	34 lbs

Price	Roller and Frame fitted complete	**Rs. 33-0**
„	Roller fitted with Spindle	„ **20-0**
„	Frame without Roller and Spindle	„ **20-0**
„	Short Rollers and Frames Pattern 314, 8¼ ins. long by 4 ins. dia	„ **18-0**

Self-lubricating Pulleys and Frames.

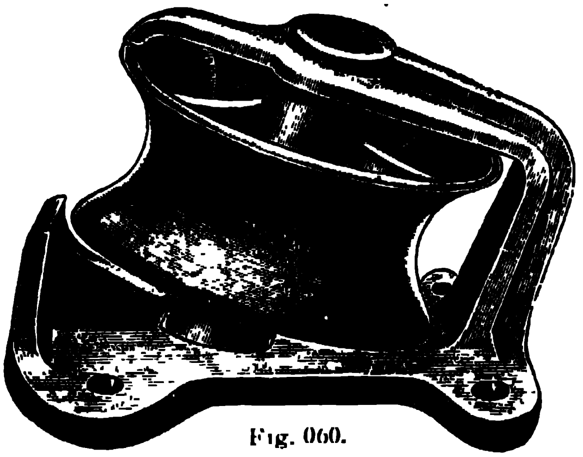


Fig. 060.

For Curved Tracks.

Both the Pulley and Frame are of best cast-steel.
Advantages—

1. Simplicity of construction—No liability of getting out of order.
2. Lightness combined with strength—All the parts are of the best cast-steel.
3. Self-lubricating—The only attention required is to fill the grease cup at the top.
4. Economical—The pulleys when worn out can be easily replaced in the frame in a few minutes.

Pattern No.	Dia. Pulley over Flanges.	Extreme Height of Frame.	Weight complete.	**Price, Rs.**
060	12¾ and 8 ins	9¾ ins.	73 lbs.	**29-0**

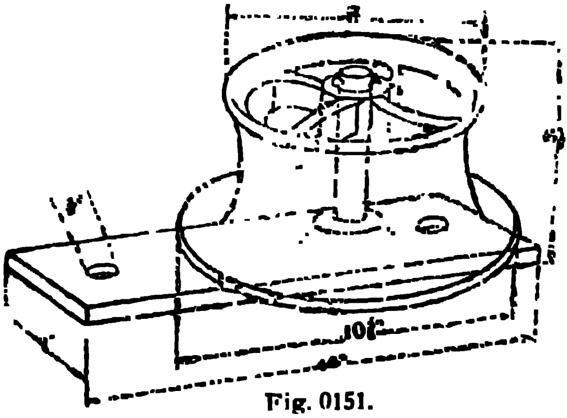


Fig. 0151.

Pulleys and Stands.

For Fixing on Straight Tracks and Guiding Rope Round Curves.

Pattern No. 0151.

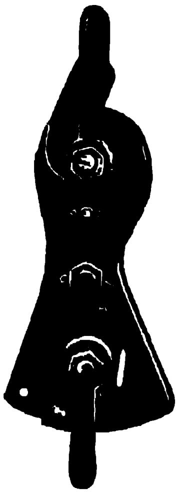
Weight of Stand	**11 lbs.**
„ Pulley and Spindle	**25 „**

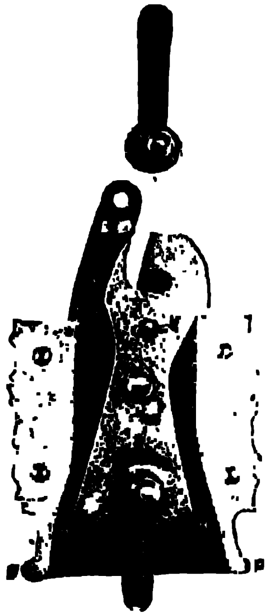
Price, Rs. 16-0.

Special quotations for large quantities. Particulars of other sizes and patterns on application.

Ormerod's Latest Improved Registered Design Safety Detaching Hooks.

For the Prevention of Accidents from Overwinding.





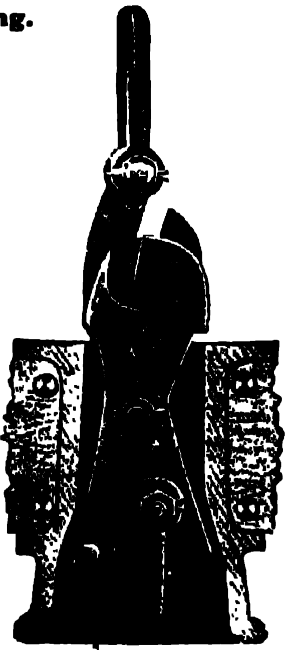
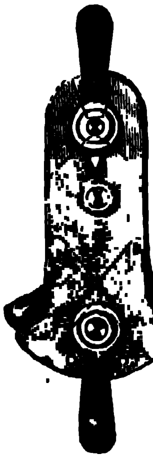


Fig. I Fig. II. Fig. III. Fig. IV.

The apparatus when in ordinary use as in Fig. I is wider at the bottom than the top; but in the event of overwinding the link is drawn into the Bell-mouthed cylinder FF in Fig. III, the wide part of the link at HH coming in contact with the cylinder at FF, thereby closing the bottom part of the link, and causing the top part to expand and the projections to catch over the top of the cylinder, while at the same time the rope shackle A is forced out of its seat and allowed to go free, and the bottom shackle B drops into the slot D and locks the link firmly in its position. The cage being suspended from the chain cannot fall back. To prevent the possibility of the link becoming disarranged in ordinary work, a small copper pin P is inserted through the plates, which pin is sheared off as the apparatus passes into the cylinder.

For lowering the cage, the shackle is attached to the ear on the middle plate as shown in Fig. IV. On removing the pin C, and slightly winding the rope, the middle plate (having a slotted hole in it) is elevated into the position shown, and allows the apparatus to pass down through the cylinder, and safely lower the cage.

Humble's Improved Patent Safety Detaching Hooks.



Humble's Patent Safety Hooks are similar in action to the above but are fitted with Catch Plates, as illustrated in Fig. 2 in place of cylinders.

Working load. tons.	3	4	5
ORMEROD'S Patent Rs.	**415**	**635**	**675**
HUMBLE'S " "	**445**	**510**	**555**

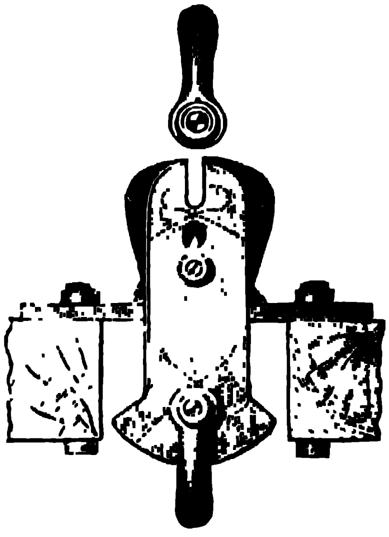
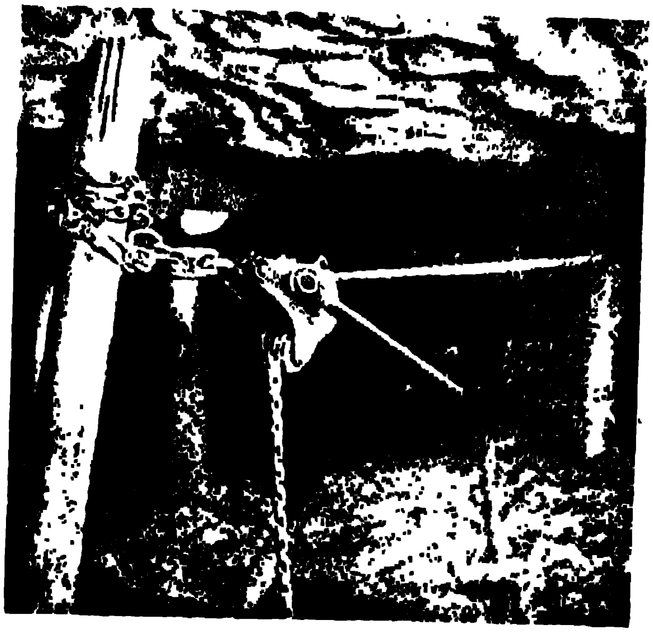


Fig. 1. Working order.

Fig 2. Detached and suspended.

Prices for Hook up to 20 tons Working Load on application.



Prop Withdrawers.

Sylvester's Patent.

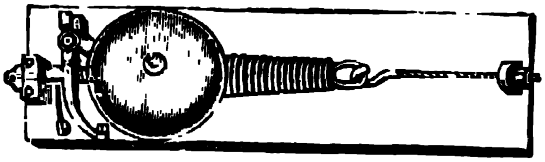
This appliance is specially adapted for the withdrawal of props. The cost of these props forms the largest item of expense in underground requisites, and their recovery from the "wastes" or grooves is one of the most dangerous operations miners have to perform. The appliance is intended to remove the danger.

They can also be used for other purposes, such as drawing loaded wagons back again up the incline or releasing buried wagons, rails, etc.

Price, complete with 5 yards chain, [illegible] in. diam.

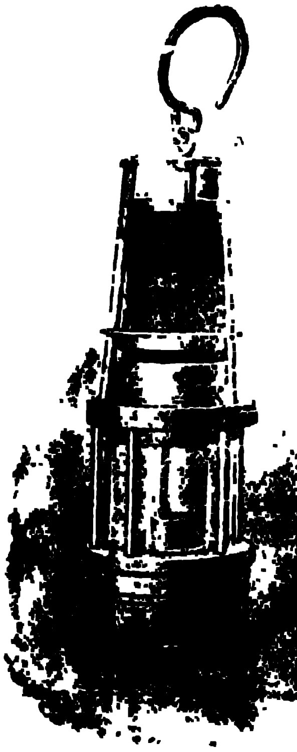
Rs. 52-0 each.

Bache's Colliery and Signal Bells.

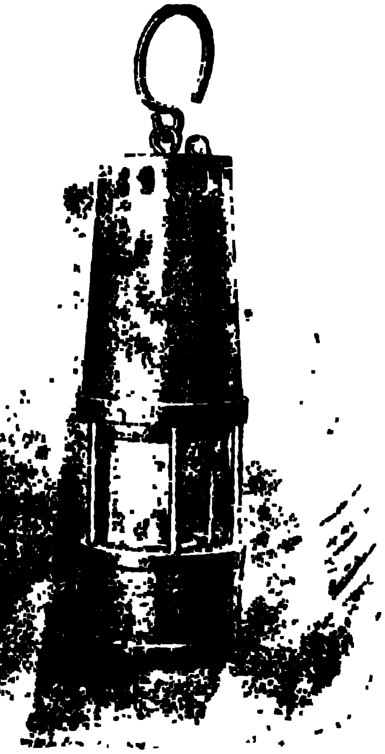


Prices.

With 6-in. Gun-metal Bell	**Rs. 62-0**
„ 7-in. „ „ „	**„ 72-0**
„ 8-in. „ „ „	**„ 82-0**



With Shield Removed.



Lamp Complete.

Miners' Safety Lamps.

By Richard Johnson Clapham and Morris, Ltd.

This pattern of safety lamp has been tested in a current of explosive gaseous mixture travelling at the velocity of 40 feet per second without being exploded. It will burn in any part of a Colliery where a candle or Davy lamp will burn, and will produce a better light than any other safety lamps, burning an equal quantity of oil.

All fittings are interchangeable.

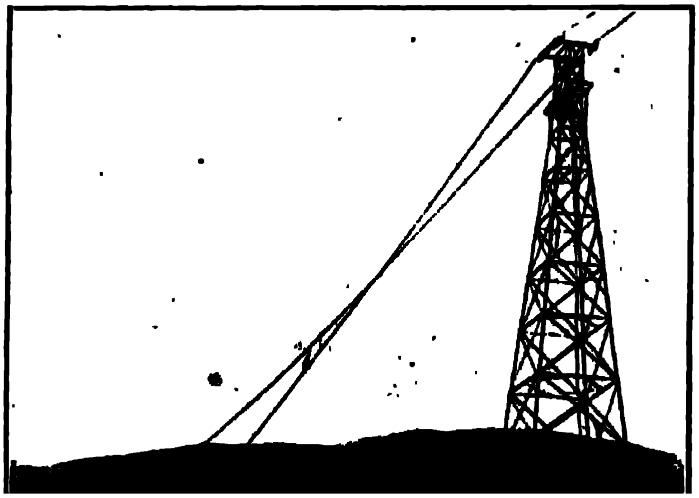
Price, Rs. 19-8 each.

Spare Glasses	**.. Rs. 6-12 per doz.**
„ Gauzes	**„ 24-0 „**
Gauze Brushes	**.. „ 36-0 „**

Aerial Ropeways.

Introduction.

For transport over level or hilly ground the Aerial Ropeway has a marked advantage over other transport systems. No purchase or lease of ground is required except for supports, while the cost of transportation compares favourably with any other means, even over level ground, and in cases in which the Ropeway traverses ground of variable altitude, it may be automatic in action, and even in some cases where the gradient is in favour of the load give off power which may be usefully employed. In a well-designed line such as we offer, a line of 2 miles, conveying 40 tons per hour, with a mean grade of only 1 in 25 or 4 per cent., becomes automatic This method of transportation is particularly applicable to mines for the conveyance of coal and ore to railway loading depôts; Forestry Departments for conveying rough sawn timber to mills; factories for conveying crates or raw material to and from rails or river, and crossing rivers or valleys where no other communication can be made except at prohibitive expense.



System.

Aerial Ropeways may be broadly divided into two distinct types, *viz.*:—

(1) That in which the loads are suspended from carriers or small trolleys running along fixed rail cables and drawn or controlled by a separate traction rope.

(2) That in which a single endless constantly moving rope not only supports the load but carries it along.

The disadvantages of the Double Rope type in first cost and upkeep are apparent, and in addition to this the uneven wear both at the highest points and on the top of the cable only and expensive inspection, greasing, etc., which can only be performed by men travelling on the line in carriers, make the single rope system preferable. These disadvantages which are inherent to the double rope system do not apply to single ropes which are less complicated in operation and cheaper in first cost; while maintenance, owing to the even wear of the rope, is very much less.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW.

JESSOP & Co. LTD ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Aerial Ropeways.

In this connection special balanced sheaves are mounted on the supports sustaining the greatest weights, which automatically distribute the pressure equally among the sheaves in any particular group.

Choice of Route. The following considerations should influence the choice of route:—

Intermediate gradients or differences of altitude, although affecting strains in the rope to some extent, have no bearings on the power question, this being solely determined by the difference in altitudes of the terminals. The route may therefore with advantage be made as straight as possible. An ideal ropeway should naturally run straight from point to point, and therefore angle stations should only be considered in order to overcome questions with regard to right of way or to avoid some extraordinary feature of the ground; they are, however, easily worked when it is desirable to introduce them due to any of the causes mentioned. Where any choice exists, the site for any proposed angle should preferably be on practically a level stretch of ground, or on top of an elevation

Length.— The length of a ropeway is immaterial, but when considerable, it may be divided into sections, the carriers passing from one section to another by means of shunt rails. Six miles may be taken as the limit of any one section, but the length of sections decreases where excessive differences in altitudes occur. Angles can be conveniently arranged at section junctures without extra cost.

Spacing of Trestles.— The capital cost of a line largely depends on the number and convenient spacing of the trestles, which, if placed on the highest points of a line, or on hill tops, can be made low and cheap This necessitates in most cases considerable elasticity in the system adopted, and although the usual spacing is at about 150 yards apart by the special systems we offer lines have been constructed with trestles at as great an interval as 600 yards. Steel trestles are recommended on account of their lightness and the ease with which they are erected.

Particulars required to enable Estimates to be made.

1. What is the length of the proposed line?

2 How many tons have to be transported per working hour, and the number of hours to the day's work?

3 What is the nature and weight per cubic foot of the material in the state in which it would be carried?

4 Can individual loads be arranged to suit best the capacity of the line, or have they to be kept to any particular weight? (Preferably this matter should be left to us.)

5. What is the character of the ground to be traversed? State whether flat, hilly, or mountainous

6. Can the proposed ropeway be taken in a straight line from terminal to terminals?

7. Is the mean grade in favour of or against the loads? What is the approximate differences in height between the terminals?

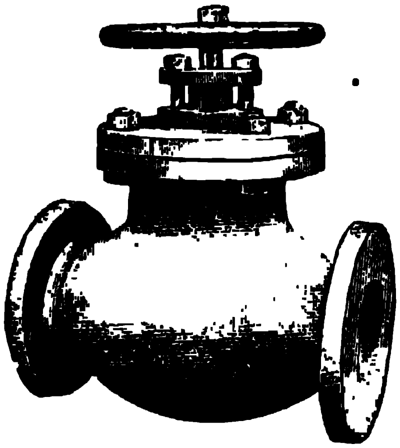
8. Are loads to be conveyed in both directions? If so, give quantity each way.

9. What are the exact terminal requirements in connection with loading and unloading? Say whether the stations would have to be raised or would be on the ground level.

10 What is the manner and cost of transportation as now carried on and over what distance?

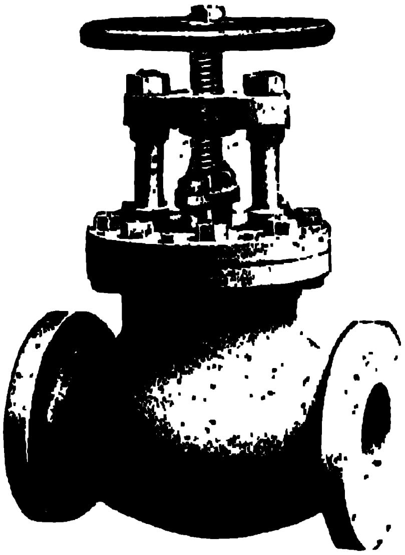
Note.—To provide a definite estimate, an accurate survey or profile of the ground is necessary, as without this the location, number and height of the supports and other matters cannot be properly determined.

Stop Valves.



The Standard Pattern Cast-Iron Stop Valves are suitable for pressures up to 125 lbs, the Heavy Pattern for pressures up to 200 lbs, and the Extra Heavy Cast-Steel Pattern for pressures up to 300 lbs. per square inch.

All Valves have Gun-metal working parts. Flanges to B. S Table No. 2, faced, but not drilled.



Size. Ins.	1½		3½	4	5	6	7	
Standard Pattern Cast-Iron Body Inside Screw. Straight Type. **Price, Rs.**	45	75	95	120	155	220	255	365
Standard Pattern Cast-Iron Body, Outside Screw. Straight Type. **Price, Rs.**	50	85	105	130	175	240	280	400
Heavy Pattern Cast-Iron Body, Outside Screw. Straight Type. **Price, Rs.**	55	105	130	165	215	300	350	500
Extra Heavy Pattern Cast-Steel Body, Outside Screw. Straight Type.	**Prices on application.**							

Angle Type, Standard and Heavy Patterns at 5 per cent. extra
Double Junction Type, Standard and Heavy Patterns at 20 per cent. extra.
Angle Type, Extra Heavy Cast-Steel Pattern
Double Junction Type, Extra Heavy Cast-Steel Pattern } **Prices on application.**

Gun-Metal Wheel Valves.

For High Pressures and Superheated Steam.

These Valves are of very substantial design with plenty of room for connecting bolts They are thoroughly well finished in every respect and are suitable for the highest class engineering installations. Valves tested to 400 lbs. per square inch.

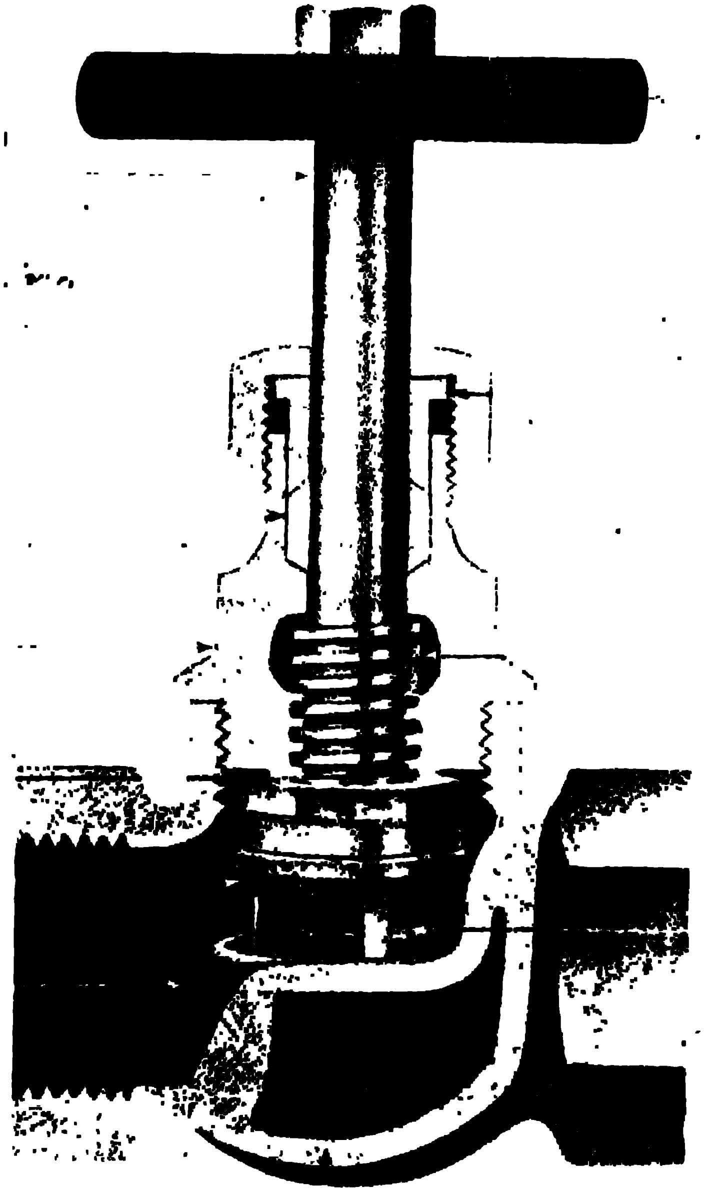
Description and size.	Ins.	¾	1	1¼	1½	2	2½	3
Gun-Metal Wheel Valves, fitted with nickel alloy, renewable and interchangeable valves and seats and bolted covers.	Female or Flanged Ends. Inside screw. **Price, Rs.**	39-0	39-0	48-0	54-0	72-0	94-0	120-0
	Female or Flanged Ends. Outside screw. **Price, Rs.**	44-0	44-0	53-0	60-0	81-0	104-0	135-0
	Female Ends. Inside screw. **Price, Rs.**	..	24-0	32-0	40-0	**Prices on application.**		
Gun-Metal Wheel Valves, new models, renewable, regrindable and reversible valves fitted with nickel alloy clacks and seats.	Flanged Ends. Inside screw. **Price, Rs.**	..	36-0	48-0	60-0			
	Female Ends. Outside screw. **Price, Rs.**	32-0	42-12	..	53-8			
	Flanged Ends. Outside screw. **Price, Rs.**	..	..	..	73-0			

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Gun-Metal Wheel Valves.



High tensile bronze spindle of larger diameter than is usual, thereby imparting great strength.

Ample high grade asbestos packing.

Heavy uniform bonnet.

Shuts off when open, can be packed under pressure.

Valve designed to adjust itself to any position, thus preventing distortion to the seat.

Round bridge giving unobstructed passage equal to full bore of pipe.

Corrugated iron wheel, black japanned finish, comfortable hand grip.

Strong packing gland carefully machined and fitted to ensure firm compression of asbestos packing.

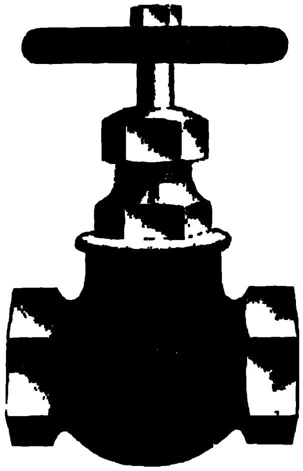
Machine cut square threads non-stripping, for severe usage. Full length of thread always in stuffing box.

High lift. Area slightly exceeds that of inlet, therefore "no throttling" of passage.

Heavy hexagons, allowing good grip for wrench and ample depth for pipe thread.

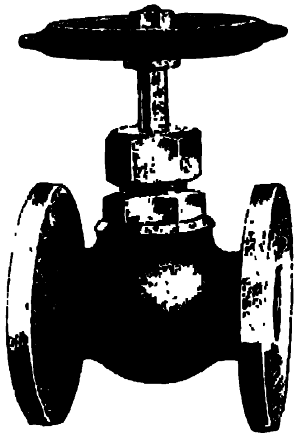
1-in. Standard Pattern Wheel Valve.

Full Size.

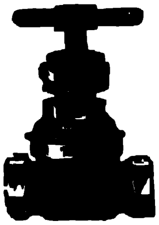


Gun-Metal Wheel Valves.

These Valves are manufactured from the finest materials and are of first class workmanship and finish.



Size. Ins.	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4
Standard Pattern, screwed female suitable for steam pressures up to 150 lbs. per square inch. **Price, Rs.**	1-12	2-0	3-0	4-4	6-4	8-4	10-4	15-4	28-0	42-8	70-0
Weight	0 6	0 9	0-15	1-9	2-11	3 8	5 0	7-15	13 11	20 12	32-0
F. to F. Measures Ins.	1⅝	1⅞	2¼	2 11/16	3¼	3⅝	4	4⅞	6 1/16	6⅝	8 1/16
Standard Pattern, Flanged, suitable for steam pressures up to 150 lbs. per square inch. **Price, Rs.**		..	6-0	8-4	11-8	15-8	20-0	28-0	45-0	64-8	101-0
Weight	..	.	2 5	3 5	5-6	7 4	9 8	13 0	21 12	28-8	46 0
F. to F. Measures Ins.	.	..	2¼	2⅝	3 1/16	3 11/16	4⅛	4 11/16	5½	6 1/16	7¼



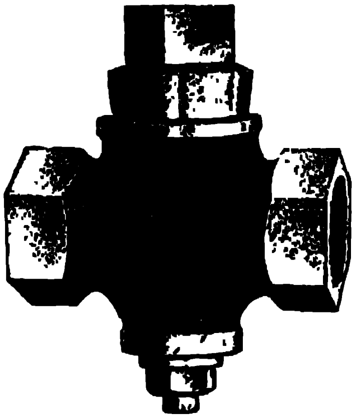
The above Valves can be supplied ANGLE TYPE at 10 per cent. extra.

Gun-Metal Fullway Valves.

Size. Ins.	½	¾	1	1¼	1½	2	2½	3
Standard Pattern, Split Wedge Gate Valve, screwed ends, suitable for hydraulic pressures up to 200 lbs. per square inch **Price Rs.**	5-0	5-8	7-4	9-8	11-4	16-8	26-8	35-0
Weight	1-3	1-12	2 9	3 13	5 0	7 10	12-8	18-0
F. to F. Measures Ins.	2⅛	2⅝	2⅞	3¼	3½	4	4½	5⅝
Standard Pattern, Split Wedge Ditto flanged, suitable for hydraulic pressures up to 200 lbs. per square inch. **Price, Rs.**	7-4	9-8	12-0	15-0	20-8	28-0	45-8	60-0
Weight	2-11	3 15	5-9	7-11	10 3	15-2	22-8	29-12
F. to F. Measures Ins.	3	3⅜	3⅝	3⅞	4 1/16	4 13/16	5¾	6½

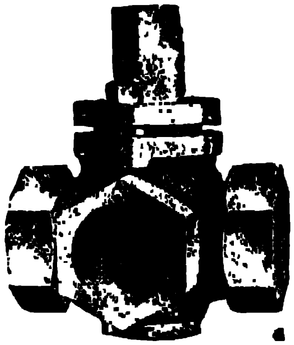
Weights given above are not guaranteed.

Gun-Metal Steam Plug Cocks.


Plug Cock.

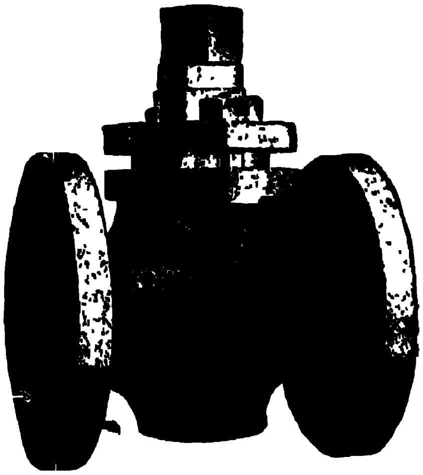
All cocks have correctly tapered plugs. The grinding is carefully and well done, with the result that they are perfectly tight under pressure and yet capable of being easily opened or closed.

All weights given below have been carefully checked, but are not guaranteed.

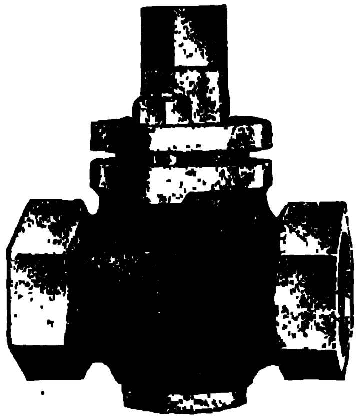

Three-Way Gland Cock.

Size. Ins.	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4
Standard Pattern, screwed ends, suitable for pressures up to 125 lbs . **Price Rs.**	2-0	2 12	3-8	4-8	6-8	9 4	12-0	18-12	35-8	54 0	103-0
Weight	0 5	0 9	0 15	1 8	2 6	3 8	4 14	8 0	15 4	23 0	44-0
F. to F. Measures . Ins.	1⅞	2¼	2½	3	3½	4	4½	5¼	6½	7¾	9

Gun-Metal Steam Gland Cocks.


Gland Cock.

Male and Female End Plug and Gland Cocks same price as Standard Pattern, screwed ends.

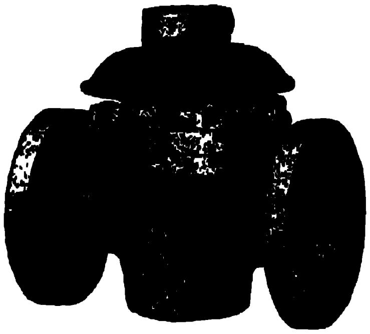

Gland Cock.

Size. Ins.	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Standard Pattern, screwed ends, suitable for pressures up to 125 lbs. **Price, Rs.**	2-8	3-4	4-0	5-8	7-12	11-8	15-8	24-0	45-0	65-0	94-0	122-0
Weight	0 8	0-12	1-3	1 14	3 0	4-10	6 4	10 0	18 8	27 8	41-0	51 0
F. to F. Measures Ins.	1⅞	2¼	2½	3	3½	4	4½	5¼	6½	7¾	8¼	9
Standard Pattern, flanged ends, suitable for pressures up to 125 lbs. **Price, Rs.**	..	..	7-8	10-8	15-0	20-0	30-0	39-8	66-0	92-0	124-0	145-0
Weight	..	..	2-4	3-6	5½	7-12	10-10	16-0	27 8	39 0	57-0	67-0
F. to F. Measures Ins.	..	..	2⅝	3	3½	4⅛	4⅝	5 5/16	6¾	7⅝	8⅝	9⅝
Standard Pattern, three-way Gland Cock, suitable for pressures up to 125 lbs. **Price, Rs.**	..	..	5-12	9-0	11-8	16-8	21-8	33-0	21-8	58-0	..	85-0
Weight	..	..	1-6	2-3	3-8	5-7	7-2	11-4	21-0	30-8	..	..
F. to F. Measures Ins.	..	..	2½	3	3½	4	4½	5¼	6½	7¾	..	..

Prices for other types on application.

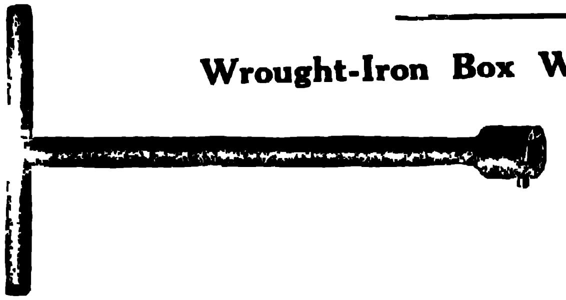
Gun-Metal Asbestos Packed Blow-off Cocks.

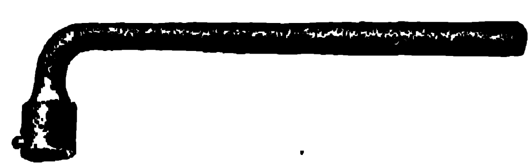
Suitable for Steam Pressures up to 200 lbs. per square inch.



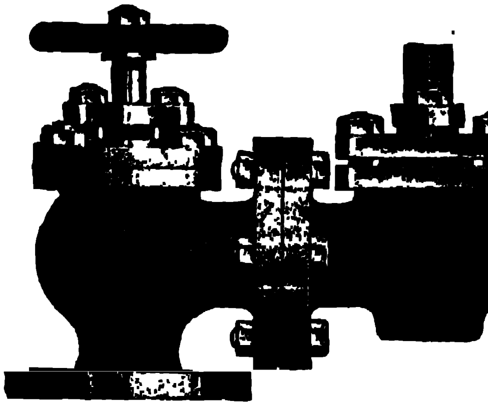
Size.	Ins.	1½	2	2½	3
Standard Pattern, screwed, with compound glands Locking Guard and Dust cover complete	**Price, Rs.**	**58-0**	**88-0**	**128-0**	**165-0**
	Weight	15-8	29-0	46-0	58-0
F. to F. Measures	Ins.	6½	7¼	9½	10
Standard Pattern, flanged, with compound glands Locking Guard and Dust cover complete	**Price, Rs.**	**72-0**	**110-0**	**152-0**	**190-0**
	Weight	21-8	40-0	58-0	70-0
F. to F. Measures	Ins.	6¾	8	9¼	9½

Wrought-Iron Box Wrenches for Blow-off Cocks.





Suitable for Cocks of the following Bore. Ins		1½	2	2½	
Curved Pattern	.. **Price,** each **Rs.**	**15-8**	**18-0**	**22-0**	**27-0**
Handle ,,		**18-0**	**21-0**	**25-0**	**32-0**



Gun-Metal Combined Cocks and Check Feed Valves.

The illustration shows cock with double gland, but prices given are for single gland cocks.

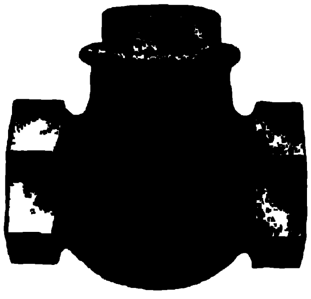
Please specify when ordering, position of valve by adding the letters F., R. or L., according as the valve is to the front, right or left when facing Boiler.

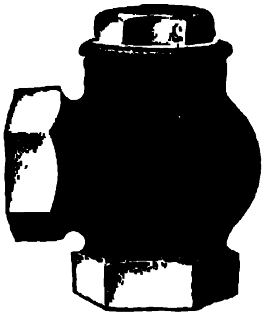
Suitable for Pressures up to 180 lbs.

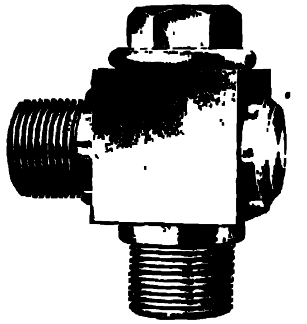
	Size.	Ins.	½	¾	1	1¼	1½	2
F R L	**Combined Gland Cock and Check Valve,** screwed ends, male	**Price, Rs.**	**15-8**	**21-8**	**26-8**	**32-0**	**40-0**	**65-0**
		Weight	2-8	4-8	6 8	7-12	10-12	18-0
	Inlet fitted with nut and ring for copper pipe. if required, at following extra ..	.. **Rs.**	**1-8**	**1-8**	**2-0**	**2-8**	**3-0**	**4-0**
F R L	**Combined Gland Cock and Check Valve,** with flanged ends	**Price, Rs.**	**19-8**	**24-8**	**32-0**	**38-0**	**50-0**	**77-0**
		Weight	3-12	6 8	9-8	11 8	15 8	22-8

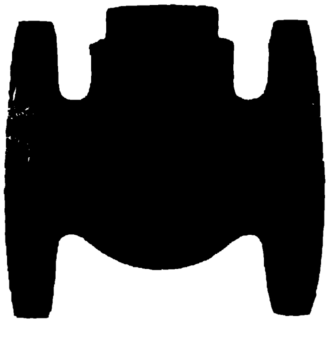
All weights given above are not guaranteed.

Gun-Metal Check Valves.







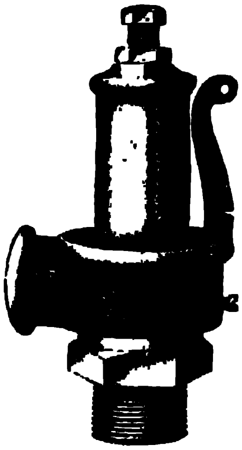


Size.	Ins.	½	¾	1	1¼	1½	2	2½	3	4
Standard Pattern, Screwed ends, suitable for pressures up to 150 lbs.	**Price Rs.**	**2 12**	**3-8**	**5-8**	**7-4**	**8-8**	**14-8**	**25-8**	**39-0**	**62-0**
	Weight	0 12	1 4	2-0	2 12	3-12	6-13	12 0	17-2	26-10
F. to F. Measure	Ins.	2¼	2 11/16	3¼	3⅝	4	4⅞	6 3/16	6⅞	8 1/16
Standard Pattern, Flanged, suitable for pressures up to 150 lbs.	**Price Rs.**	**6-0**	**8-0**	**10-8**	**15-0**	**19-8**	**28-0**	**44-0**	**62-0**	**100-0**
	Weight	2-3	3 0	4 12	6-4	8 4	12-13	20-0	24-4	40-10
F. to F. Measure	Ins.	2¼	2⅝	3 3/16	3 11/16	4⅛	4 11/16	5¼	6 1/16	7¼
Square Box Pattern Angle Check Valves (winged valves), suitable for pressures up to 250 lbs	**Price Rs.**	**6-0**	**7-0**	**9-8**	**12-8**	**18-0**	**26-8**	..	..	..
	Weight	0 12	1-2	1-15	2-9	4 0	7-4	..	..	..

ANGLE TYPE at 10 per cent. extra.

Gun-Metal "Pop" Safety Valves.

The Gun-Metal Safety Valve, Lock-up type, as illustrated, is one that has been strongly recommended by the Bengal Boiler Commissioners for some years for fitting to Boilers under their jurisdiction. The Valve is thoroughly reliable in its action, and being locked, is difficult to tamper with. The Valves are carefully adjusted to 100 lbs. before leaving maker's works, but can be readjusted for other pressures or fitted with flanges at a small extra charge.



Size.	Ins.	1½	2	2½	3
Suitable for Boilers not exceeding H. P		20-30	30-40	40-75	75-100
Top outlet Type, screwed					
Price Rs.	..	**40-0**	**57-0**	**96-0**	**132-0**
Weight	..	4-6	6-8	11-0	15-0
Side outlet Type, screwed.					
Price Rs.	..	**45-0**	**62-0**	**140-0**	**175-0**
Weight	..	5-6	8-0	14-6	20-0

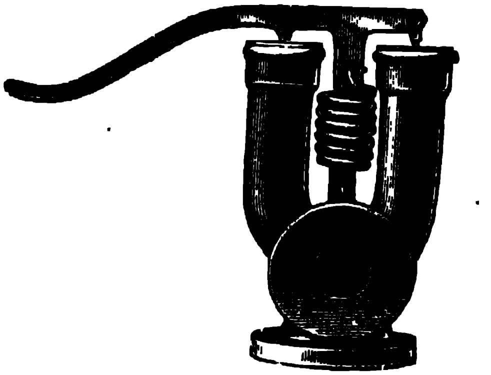
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Bailey-Ramsbottom Patent Spring Safety Valves.

For Locomotive, Portable and Vertical Boilers.

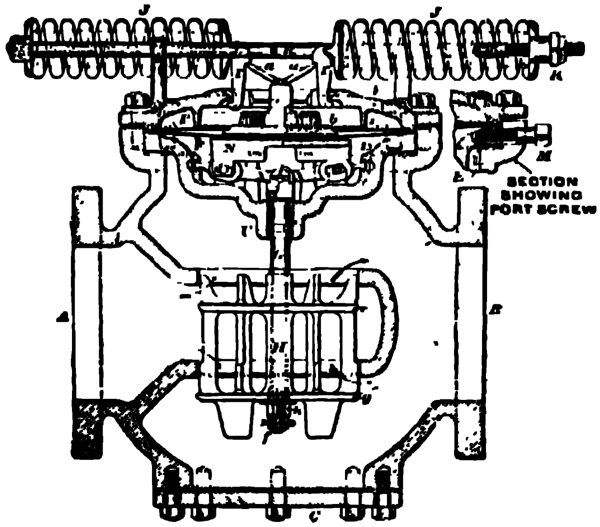


The Bailey-Ramsbottom Patent Safety Valve is approved by, and meets the requirements of, the Bengal Boiler Commissioners.

The principle of the double Safety Valve is that, if one of the Valves should stick, it acts as a fulcrum for the lever and other valve

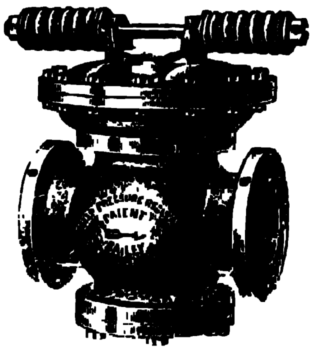
Made of Iron, with Gun-Metal Valves and Seats.

Dia. of Valve. Inch.	Dia. of Flange. Inch.	Price, each, for 80 or 100 lbs. Pressure
2	10	Rs. 135-0
2½	11	192-0
3	13	227-0
3½	15	280-0



"Full-Bore" Pressure Reducing Valves.

Foster's Patent, "Class W."



The only Reducing Valve that delivers steam at constant reduced pressure, but varying in volume from "full-bore" downwards, according to the demand made upon it.

Particulars and prices.

Valves delivering 10 to 60 lbs. on the reduced side.

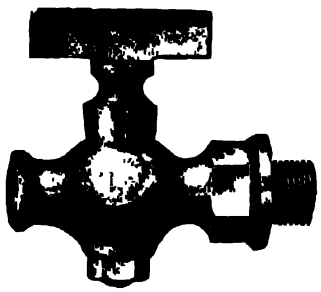
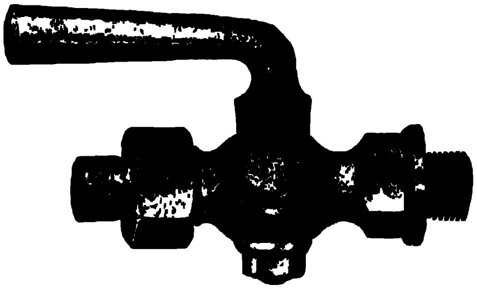
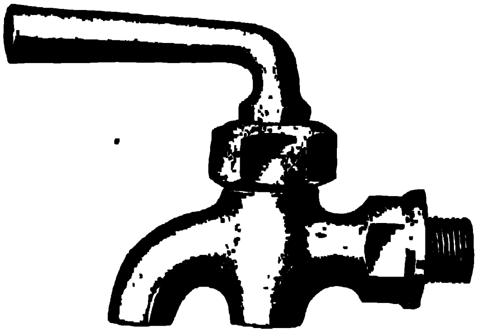
In iron with G.-M. Spindle. For 150 lbs. pressure.

Size.	Ins.	1½	2	2½	3	3½			6	7	
Diameter of Flanges	Ins.	5½	6½	7½	8	8½	9	11	12	13½	14½
Length over Flanges	"	6	7½	10	10	11½	12	16	16½	19	21½
Price, each	**Rs.**	**155**	**175**	**235**	**280**	**375**	**430**	**505**	**620**	**790**	**895**

Action of the Valve.

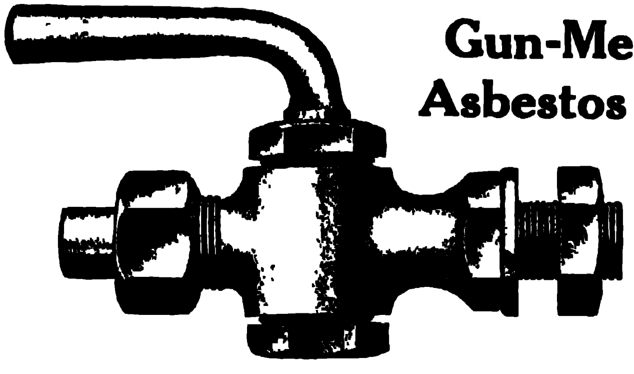
Foster's Class W valve is controlled and operated by the movement of a diaphragm opposed to the action of springs whose tension is adjusted to the delivery pressure to be maintained and this pressure is entirely independent of the pressure in the supply pipe The steam or other fluid enters the valve at A and following the direction indicated by the arrows, finally passes out at B. In its course it enters the diaphragm of chamber D through port E and causes the diaphragm to rise and close the valve H in opposition to the power of the springs J. J. These springs, adjusted by nut K, tend to open valve H against the delivery pressure bearing on the diaphragm F—one balancing the other. An equilibrium between the two forces is thus instantly established If from any cause the pressure on the delivery side increases, this pressure bearing on the diaphragm overcomes the resistance of the spring and tends to close the valve, drawing it towards its seats until the equilibrium is restored. On the other hand if the delivery pressure falls, the springs overcome the pressure bearing on the diaphragm and force the valve open until the equilibrium is again established.

Gun-Metal Pet or Gauge and Cylinder Drain Cocks.

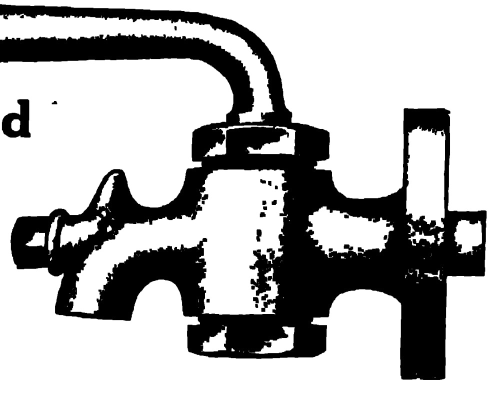




These cocks are carefully polished and of best Engineers' finish throughout.

Size.	In.		¼	⅜	½	⅝	¾	
Standard Patt. Round Barrel, Straight Nose.	**Price, Rs.**	**1-12**	**2-0**	**2-8**	**3-0**	**4-0**	**5-0**	**8-0**
	Weight	0-2	0 3	0-5¼	0-7½	0-8	0-12¼	1-3
Standard Patt. Round Barrel, Bib Nose.	**Price, Rs.**	**2-4**	**2-8**	**2-12**	**3-8**	**4-8**	**5-12**	**8-8**
	Weight	0-2½	0 3½	0-5¼	0 8	0-8½	0-13	1-4
Standard Patt. Gland Packed, Straight Nose.	**Price, Rs.**	**3-8**	**3-12**	**4-0**	**5-0**	**5-8**	**6-8**	**10-8**
	Weight	0-4	0-5	0-7	0-11	0-14	1-2½	1-12
Standard Patt. Gland Packed, Bib Nose.	**Price, Rs.**	**3-12**	**4-0**	**4-8**	**5-8**	**6-0**	**7-8**	**11-8**
	Weight	0-4½	0 5¼	0-7¼	0-11¼	0-14½	1-3½	1-13
Standard Patt. Cylinder Drain Cocks.	**Price, Rs.**	**2-8**	**2-12**			**5-4**	**6-4**	**10-8**



Gun-Metal Asbestos Packed Test Cocks.



Size	In.			⅝	¾	
Round Barrel Asbestos Packed Test Cock, screwed end fitted with backnut.	**Price, Rs.**	**7-0**	**9-8**	**12-0**	**14-8**	**18-8**
	Weight	1-3	1-12	2-4	3-0	4-0
Long Barrel Asbestos Packed Test Cock, screwed end fitted with backnut.	**Price, Rs.**		**10-8**	**12-8**	**15-0**	**21-0**
	Weight		2-0	2-10	3-8	5-2
Extra if either of above types with hook on nose for Salinometer Cup	**Price, Rs.**	**0-8**	**0-8**	**0-12**	**1-0**	**1-0**
Extra if either of above fitted with heavy union nut and B. M. ring for copper pipe	"	**1-4**	**1-4**	**1-8**	**1-12**	**2-8**
Extra if either of above fitted with union nut and tailpiece for copper pipe	"	**1-8**	**1-8**	**1-12**	**2-4**	**2-12**
Extra if either of above with flanged instead of screwed ends	"	**5-0**	**6-0**	**6-0**	**7-0**	**8-0**
Standard diameter of flanges	Ins.		3½	3¾	4	4¼
Diameter of Spigot	"		¾	⅞	1	1⅛

All weights given above are not guaranteed.

Steam Traps.

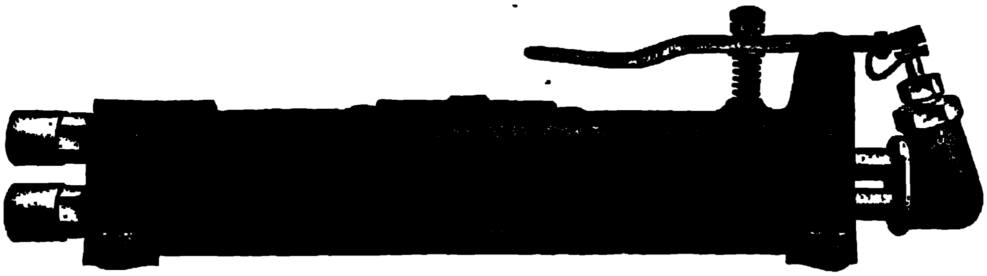
General Information.

Steam Traps when cold are wide open, so that at starting all air and water are expelled from the pipes when steam commences to pass. The traps close automatically, so that there is no possible chance of water hammer and rents occurring in pipes through an accumulation of cold water suddenly receiving the impact of live steam—the cause of many accidents.

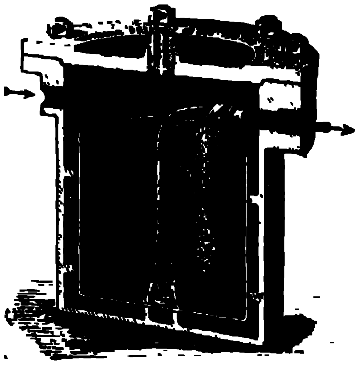
The traps should always be fixed at a point where a droop or bend in the pipe is situated, and at the lowest possible point.

Every pound of steam will lift a column of water 2¼ feet, so that in arranging for tanks, if 2 feet of water for every 1 lb. of steam pressure is allowed for, the allowable height for placing the tank can be ascertained. In this case a non-return valve, similar to a boiler feed check valve, should be placed on the outlet side when the trap is used for lifting water, to prevent the water returning into the pipes when the main steam is shut off.

Geipel's Steam Traps.



Size No.		1	2	3
Discharge in Gallons	per hour.	500	1,000	1,500
Pipe Surface Equivalent	sq. ft.	1,000	2,000	3,000
Approximate length	Ins.	18	23	24
„ height		7	7	8
Diameter of Inlet and Outlet, Screwed Gas		¾	1	1½
Price, each	Rs.	**112**	**150**	**205**



Ordinary Steam Traps.

These Steam Traps are tested by steam and hydraulic pressure, and are made in two series, *viz*:—for steam pressures of 60, 80 and 100 lbs. per square inch, and for 50 lbs. per square inch and under. Each Trap has the pressure for which it is constructed stamped on the top cover.

Directions for fixing.—Insert a tee-piece or union in the lowest part of the line of steam pipe where the water accumulates, and carry a pipe from thence to "Inlet" of steam trap, which may be placed in any convenient situation below.

Before starting, remove cover and fill the annular space around float with water.

Trap for 100 lbs. Pressure.

Size No.		1	2	3	4
For Steam pipes, diameter	Ins.	2 to 3½	4 to 6	6 to 8	9 to 12
Approximate quantity of Water expelled per hour at 100 lbs. pressure	Lbs.	13	64	130	300
Diameter, Inlet and Outlet	Ins.	¾	1	1½	1¼
Overall height	„	13¼	18⅜	28	41¼
„ diameter	„	11⅝	16⅜	20	25½
Approximate weight	Cwts.	1	2¼	4¼	10½
Price for 100 lbs. per square inch ..	**Rs.**	**78**	**164**	**250**	**325**

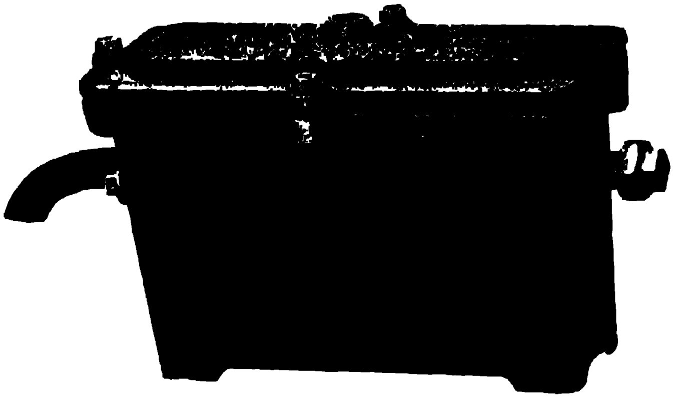
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

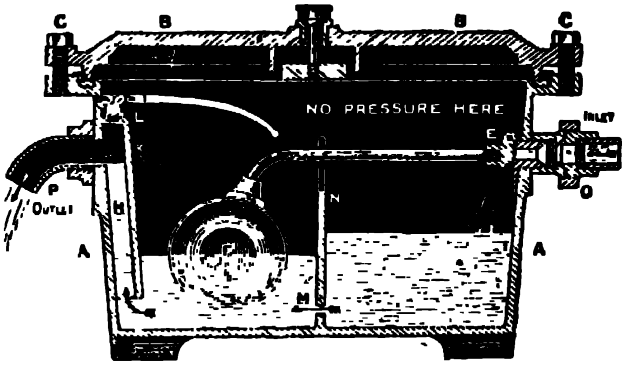
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Syphonia" Steam Traps.

Royle's Patent.





Special Features.

Will work at any pressure, without adjusting.
No pressure in the box, no liability to burst.
Easy of access.
Easy to fix, inlet and outlet in line and in same plane.
Only one wearing part, **Valve E,** and that is made interchangeable.

Description.—The apparatus to be drained is connected to the Union O, the Trap is first filled with water and the lid fixed, steam being now turned on, the water of condensation flows freely through the open Valve E, and out by the Syphon H. As soon, however, as the steam arrives, and the pressure tends to accumulate in the Trap, the water is forced up the Syphon H the Ball F following the water down, this partially closes the Valve E. In practice, the Ball finds a position where it will pass all the condensed water, plus sufficient steam to fill the box. The Valve E never really closes. The Ball thus acts as a weight, and being made heavy and strong, is therefore not liable to collapse. Every Trap is thoroughly tested before leaving the makers' works.

Made in five different classes as follows:—

Class A. For general purposes and all pressures under 100 lbs.

Class B. For high pressures up to 200 lbs.

Class C. For elevating purposes.

Class D. "Blow-Through" pattern. Most convenient Trap for use with all Steam Apparatus which it is desirable to blow through on starting up.

Class E. Fullway, Low Pressure pattern, very suitable for Drying Cylinder use and like conditions.

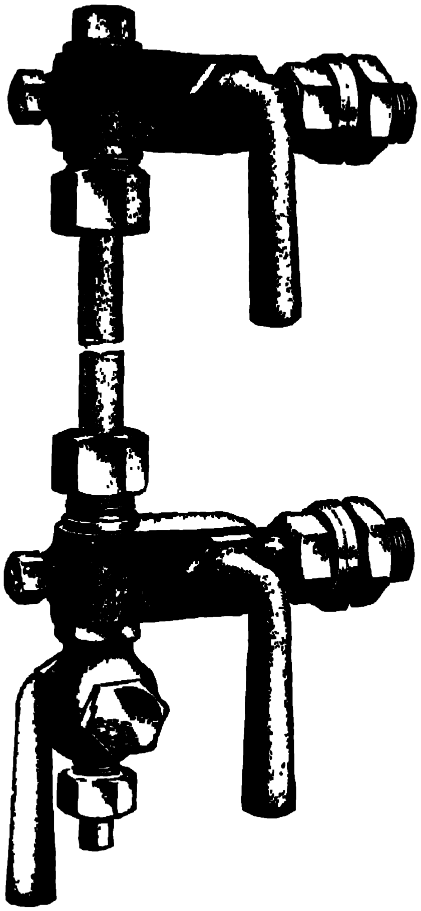
Class A.

Size of Inlet.	Size of Outlet.	Maximum Working Pressure.	Price, each.
Ins.	Ins.	lbs.	Rs A
3/8	1/2	100	40 0
1/2	3/4	100	55 0
3/4	1	100	67 8
1	1¼	100	82 8
1¼	1½	100	105 0
1½	2	80	130 8
2	2½	80	200 0
3	4	80	390 0
4	5	80	630 0

Class B.

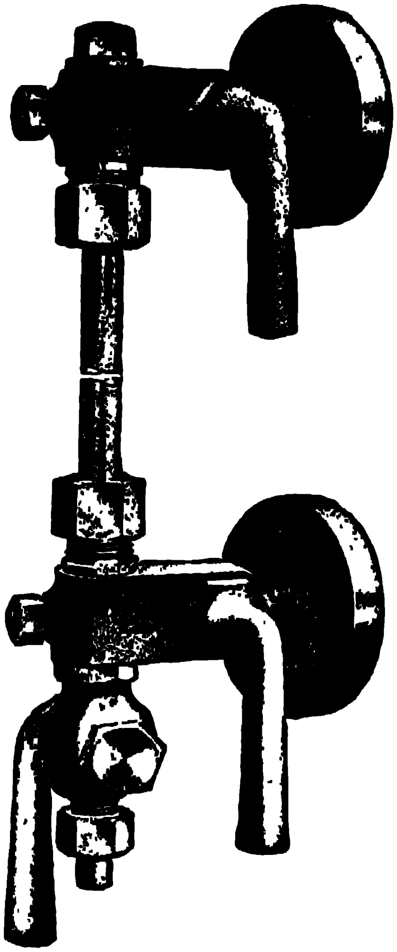
Size of Inlet.	Size of Outlet.	Price, each.
Ins.	Ins.	Rs. A.
½	½	70 0
¾	¾	90 0
1	1	105 0
1¼	1¼	135 0
1½	1½	170 0
2	2	270 0
3	3	520 0

Prices for other classes on application.



Gun-Metal Water Gauges.

With full Asbestos Packed Cocks.



Diameter of Glass.	In.	½	⅝	¾
Standard Pattern, Gland Packed. Suitable for Steam Pressures up to 150 lbs. per square inch.	**Price, per set, Rs.**	**23-8**	**34-0**	**39-8**
	Weight	4-4	6-8	7-10
	Ends Screwed, In	½	¾	¾
Heavy Pattern, do. do. 200 lbs.	**Price, per set, Rs.**	**34-0**	**37-8**	**50-0**
	Weight	6-2	7-6	10-8
	Ends Screwed, In.	½	¾	¾
Standard Pattern Screwed ends, suitable for Steam Pressures up to 200 lbs. per square inch.	**Price, per set, Rs.**	**38-0**	**48-0**	**56-0**
	Weight	8-12	11-0	16-0
	Ends Screwed, In.	½ or ¾	¾	¾ or 1
Heavy Pattern, Screwed ends, suitable for Steam Pressures up to 300 lbs. per square inch.	**Price, per set, Rs.**	....	....	**60-0**
	Weight	....	....	17-8
	Ends Screwed, In	....	....	1
Standard Pattern, Flanged ends, suitable for Steam Pressures up to 200 lbs. per square inch.	**Price, per set, Rs.**	**44-0**	**55-0**	**65-0**
	Weight	11-8	14-8	19-8
	Dia. of Flanges. Ins.	3½	4	4
Heavy Pattern, Flanged ends, suitable for Steam Pressures up to 300 lbs. per square inch.	**Price, per set, Rs.**	....	....	**75-0**
	Weight	....	....	22-8
	Dia. of Flanges. Ins.	....	....	4½

All weights given above are not guaranteed.

Gauge Glasses.

Ordinary Quality.

Dia. in.	½		5/8		3/4		7/8		1	
Length.	Price per doz.									
	Rs.	As.	Rs.	As.	Rs	As.	Rs	As.	Rs	As
10	2	8	3	4	4	2	5	6	6	8
12	3	0	3	14	4	12	6	8	7	12
14	3	6	4	8	5	10	7	8	9	2
16	3	14	5	2	6	8	8	14	10	4
18	4	8	5	14	7	4	9	10	11	10
19	4	14	6	2	7	10	10	4	12	6
20	5	2	6	8	8	0	10	14	13	0
22	5	6	7	2	8	14	11	14	14	4
24	5	14	7	12	9	10	13	0	15	8

Special High Pressure Quality.

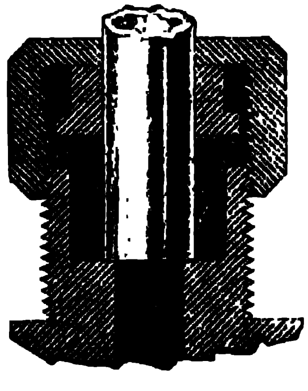
Dia. in	.5/8									
Length.	Price per doz.									
	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.
10	4	2	4	14	6	0	8	4	10	6
12	5	0	5	12	7	6	9	14	12	8
14	5	12	6	12	8	10	11	8	14	8
16	6	10	7	12	9	14	13	4	16	8
18	7	6	8	10	11	2	14	14	18	10
19	7	14	9	2	11	12	15	10	19	10
20	8	4	9	10	12	6	16	8	20	10
22	9	2	10	10	13	10	18	2	22	12
24	9	14	11	8	14	14	19	12	24	12

Accessories for Water Gauges.

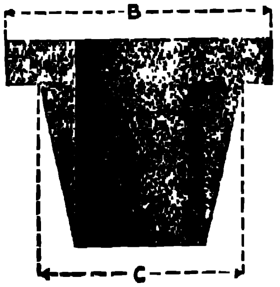
Conical Gauge Glass Rings.

Best Quality Indiarubber or Composition.

Conical Ring.



Shewing Conical Ring fitted to Water Gauge Glass.



Prices and Dimensions. Parallel Holes.

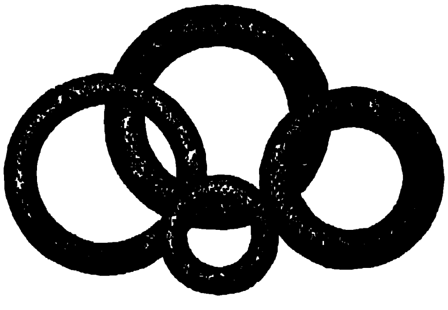
Size No.				U
Diam. .. ins.	3/8	½	5/8	3/4
" B "	15/16	1 1/16	1 3/16	1 9/16
" C "	13/16	7/8	15/16	1¼
Price per doz. Rs.	3-0	3-0	3-4	3-8

When ordering sizes not specified above, state outside diameter of Glass and inside diameter of Nut.

We supply one quality only of all the above accessories, *viz.*—the Highest Class. The material used expands and contracts with the tube, thus preventing breakage of the glass, as is customary with other packings.

Gauge Glass Rings.

Best Quality Indiarubber.



Round Section.

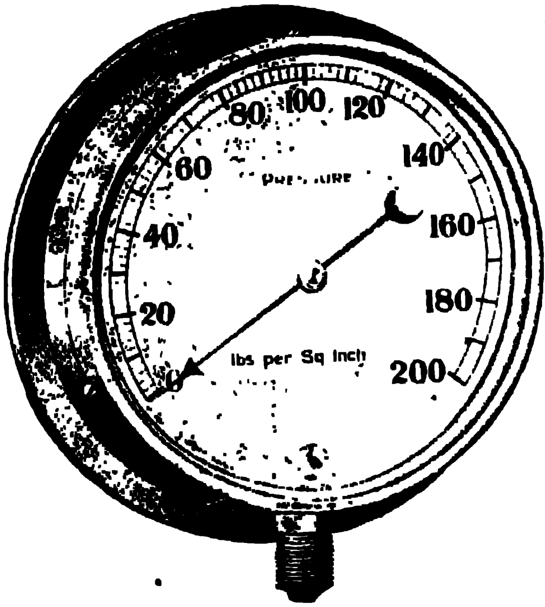
Dia. in.	½	5/8	3/4	
Price per doz. Rs.	0-12	1-0	1-4	1-12

Gauge Glass Cutters.

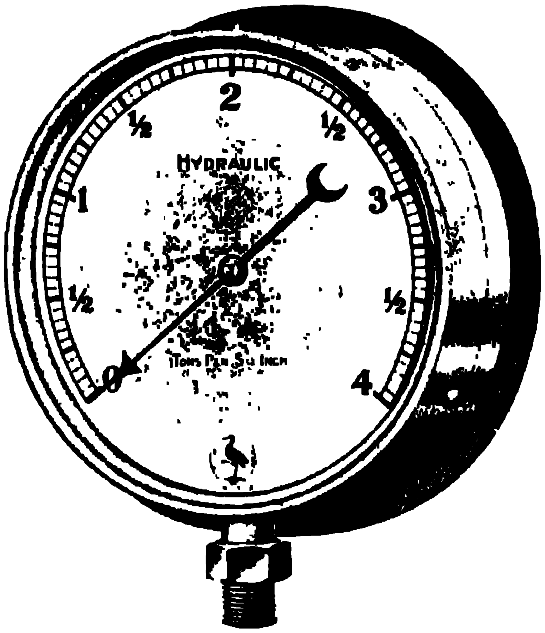
Price, Rs. 6-8 each.

Spare Wheels for Above.

Price, As. 8 each.



Pressure Gauges.



Standard Pattern Bourdon Type.

For pressures from 20 to 400 lbs. per square inch.

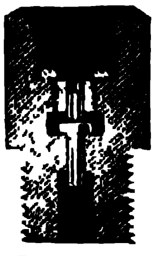
Diameter of Dial.	Ins.	3	4			7	8	10	12
Closed dial type.	Price, Rs.	15-4	18-4	19-0	22-0	25-0	26-0	45-8	54-0
Open " "	" "	17-0	20-0	21-12	23-12	26-12	27-12	47-0	56-0
Screwed British standard pipe thread.	In.	¼	⅜	⅜	⅜	⅜	⅜	½	½

Hydraulic Pressure Gauges.

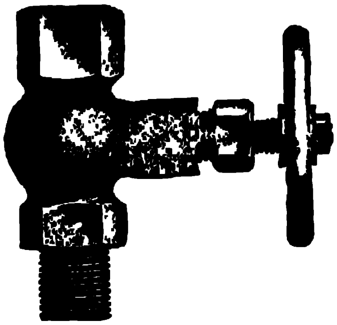
For pressures up to 10 tons per square inch.

Diameter of Dial.	Ins.	4			7	8	10	12
Hydraulic gauge without maximum pointer	Price, Rs.	71-0	73-0	74-0	77-0	78-0	107-0	121-0
Hydraulic gauge with maximum pointer, including lock-up case and padlock.	Price, Rs.	110-8	113-0	115-0	120-0	121-8	157-0	178-0
Screwed British standard pipe thread	In.				½	½	¾	¾

Hydraulic gauges are fitted with hardened and tempered steel tubes. They can be supplied with markings in lbs or tons per square inch or both.



Check Valve.



Stop Valve.

G.-M. Connection with Check Valve.

Size of female end, ½ in.
External diam. of plain end, ready for screwing 1⅛ ins.
} Price on application.

Every hydraulic gauge should be fitted with a check valve, to protect it against damage owing to sudden variation of pressure.

Hydraulic P. G. Stop Valve.

Size of female end, ½ in.
External diam. of plain end, ready for screwing 1⅛ ins.
} Price, Rs. 36-0 each.

Vertical Diaphragm (Schaffer) Type.

Pressure Gauges.

For Pressures from 20 to 400 lbs. per square inch. The construction of this type of gauge varies from that of the Bourdon type in so far as it is fitted with a Vertical Diaphragm in place of the Bronze Tube. The dial registration is obtained by the dilation of the diaphragm, and for this reason these gauges are recommended in all cases where vibration and rough usage are likely to occur, as the vibration, etc., will be absorbed by the diaphragm without causing excessive fluctuations of the pointer.

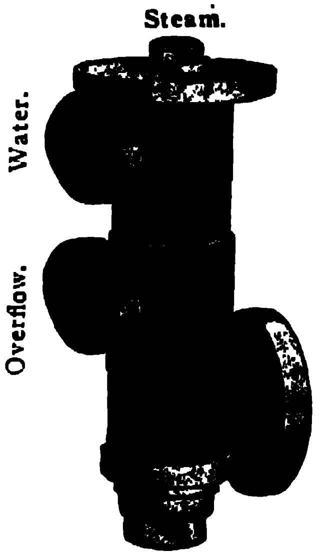
Diameter of Dial. Ins.	4	5	
Vertical Diaphragm Gauge Iron Case **Price, Rs.**	**40-0**	**46-8**	**50-0**
Screwed British Standard Pipe Thread In.	¼	½	

Combined Vacuum and Pressure Gauges.

Vacuum Gauges (Schaffer's) 0-30 ins., 6 ins. dial	**Rs.**	**33-0.**
„ and Pressure Gauges (Bourdon's) 0-30 ins. by 0-100 lbs.	„	**42-0.**
„ „ „ „ 0-30 ins. by 0-30 lbs. .. .	„	**42-0.**

Fittings for Pressure Gauges.

Size.	In	¼	⅜	½
Gun-Metal P. G. Cock, screwed ends .	**Price, Rs.**	**3-0**	**3-8**	**5-8**
	Weight	0-4½	0-6½	0-11
Gun-Metal P. G. Cock, union one end ..	**Price, Rs.**	**4-0**	**4-8**	**6-0**
	Weight	0-5¼	0-8¼	0-15
W.-I. Syphon, with 2 lock-nuts ..	**Price, Rs.**	....	**3-8**	**4-0**
	Weight	....	1-0	1-8
W.-I. Bull Ring Syphon, with 2 lock-nuts ..	**Price, Rs.**	....	**6-0**	**7-8**



Gresham's Patent Self-Acting, Re-Starting Injectors.

The self-acting type of Injector possesses great advantages over all others for simplicity of construction, manipulation and reliability, commencing to work instantly on opening the steam valve.

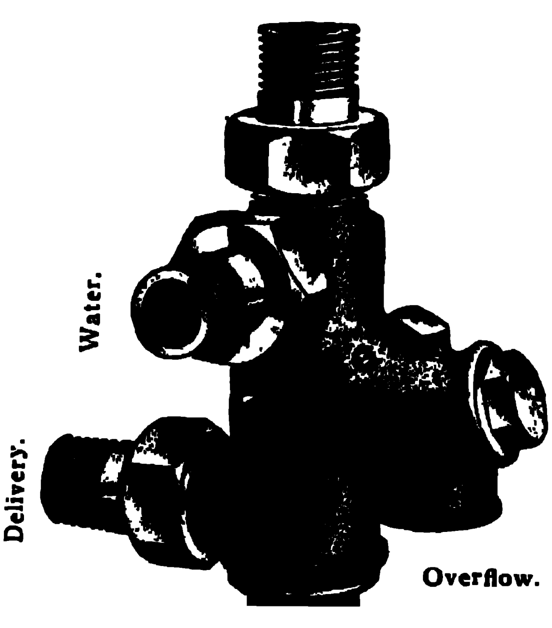
*It will re-start automatically should it cease working from any cause, for instance stoppage of steam or water supply, and requires no regulation of steam or water once the water valve has been set for working conditions.

The amount of water delivered to the boiler can be regulated, the minimum quantity delivered being about 55 or 60 per cent. of the maximum.

The Injector can be fixed in any position either above or below the water supply.

Size of Injector.	Internal Diameter of Pipes.	Price, each	50	60	70	80	90	100	110	120	130	140	150
			Gallons of water per hour at above Pressures.										
	Ins.	Rs.											
No. 3	½	42	120	140	150	160	170	180	180	190	200	210	210
„ 4	¾	54	190	200	210	220	240	250	260	270	280	300	310
„ 5	1	66	350	380	410	440	470	490	520	540	560	580	600
„ 6	1¼	78	500	550	590	640	670	710	750	780	810	840	870
„ 7	1¼	96	680	750	820	870	920	970	1010	1060	1110	1150	1190
„ 8	1½	114	890	980	1060	1130	1200	1270	1330	1390	1450	1500	1550

Instructions for fixing and working furnished.



Penberthy Automatic Injectors.

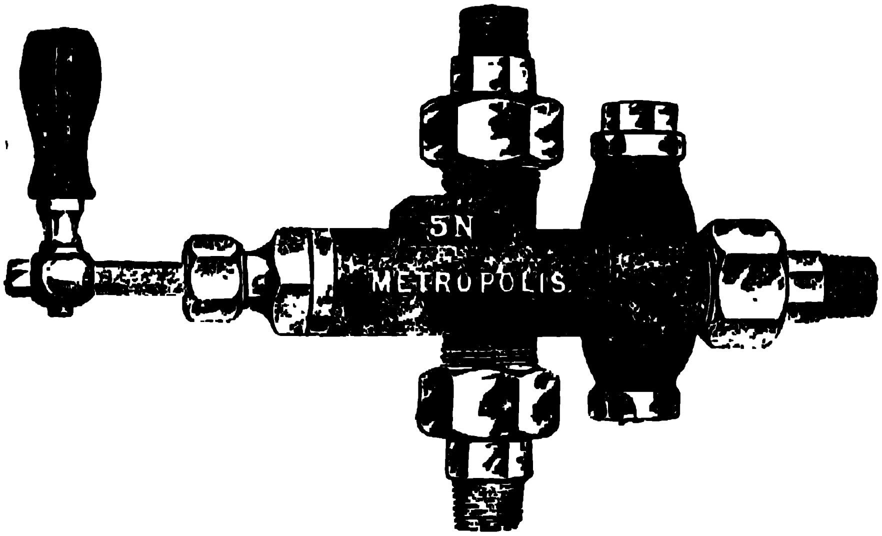
Self-Acting Re-Starting.

This type of Injector embraces a great range of capabilities and is especially suitable for Steam Wagons, Traction Engines, Road Rollers, etc.

It will work equally well when fixed either above or below the water supply, and in the former case will lift from 4 feet to 20 feet, according to the steam pressure.

The Penberthy Injector will handle hot water at a temperature up to 130° Fahr. at varying steam pressures.

Size.	Size of Pipe Connection.	Price, each.	Horse Power based on ordinary Tube Boiler.	Horse Power based on 30 lbs. water per H.P. per hour.	Capacity per hour, 1 to 3 feet lift, 60 to 100 lbs. Steam Pressure	
					Maximum.	Minimum.
	Ins.	Rs.			Gals.	Gals.
00	⅜	21	4 to 8	6 to 12	80	45
AA	½	26	12 to 22	15 to 30	180	100
BB	¾	40	20 to 45	25 to 60	360	180
CC	1	60	45 to 80	50 to 100	600	325
DD	1¼	80	75 to 135	85 to 165	1000	525
EF	1½	125	115 to 225	150 to 320	1900	850



The "Metropolis" Automatic Injector.

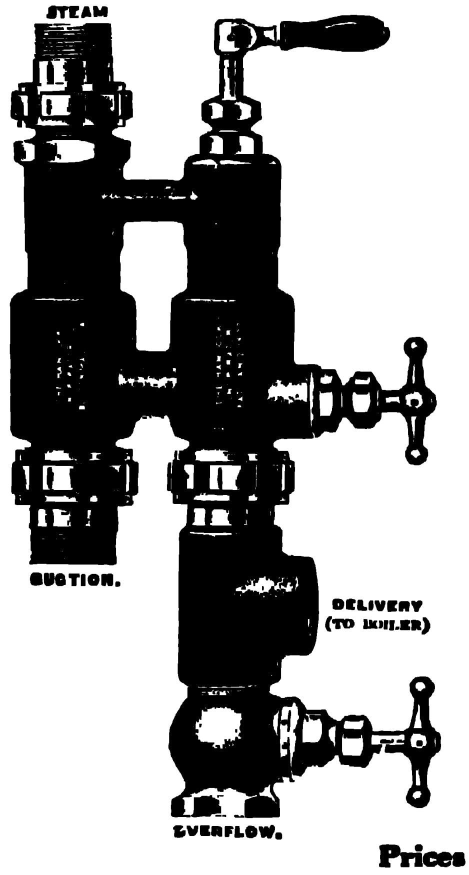
The "Metropolis" Injector is automatic and re-starting, can be operated entirely by one handle, and does not require valves on either steam or water pipes.

The feed can be regulated over 50 per cent. and it is absolutely reliable when starting and working.

All sizes of this Injector lift 15 feet and work up to 200 lbs. steam pressure.

Size	Price, each.	Size of all Pipe Connections.	Size of Overflow Pipe.	Capacity with 80 lbs. Steam Pressure 2 ft. lift.	Horse Power for Ordinary Type of Boiler and Engine.
	Rs.	In.	Ins.	Gals.	
	64	¾	1	350	20 to 30
	82	1	1¼	500	45 to 65

Particulars and Prices of larger sizes on application.



The Hancock Inspirator.

"Stationary" Type.

The Hancock Inspirator, "Stationary" Type, for general all-round service has no equal, and works with high or low steam pressures on all lifts up to 25 feet. Its operation is the same under all conditions and requires no adjustment for varying steam pressures.

The Inspirator can be used for other purposes when not feeding the boiler. The lifter side may be used as an Ejector for delivering water to a tank.

Water may be elevated above the instrument about 2½ feet for each pound of steam pressure. With 45 lbs. pressure, water may be lifted 25 feet and elevated 112½ feet above the Inspirator, a total elevation of 137½ feet.

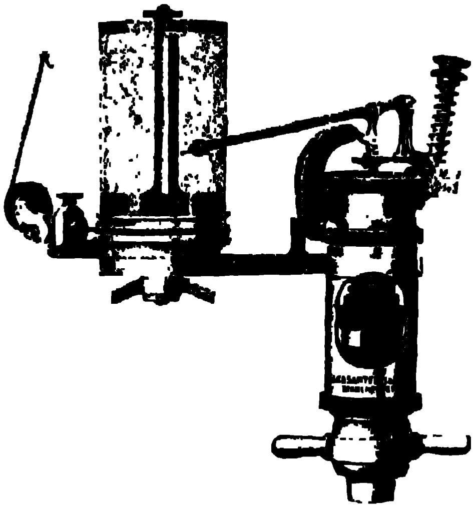
When used on a short lift the Inspirator will take feed water up to 150° fahr. with steam pressures of 80 to 150 lbs.

Size.	Price, each	Pipe Connections.			Capacity.	Nominal Horse Powers.	
		Steam.	Suction and Delivery.	Overflow.	Per hour with 60 lbs Steam Pressure 2 ft. lift.	For the Ordinary Type of Boiler and Engine.	On a Basis of 30 lbs Evaporation per Horse Power per hour.
	Rs.	In.	Ins.	In.	Gals.		
7½	55	⅜	⅜	¼	60	4 to 6	5 to 8
25	190	1	1¼	1	900	90 to 120	130 to 175

Prices of other sizes on application.

Casartelli Gas and Oil Engine Indicator.

External Spring Pattern.



Owing to the greatly increased pressures and speeds in modern Gas Engines, it has become a very difficult matter to indicate them satisfactorily with even the best of existing Indicators.

The Spring Relief Gear has been designed and arranged as an addition to the Indicator, to relieve the excessive momentary shocks to which the Indicator is exposed, say at the time of ignition in a Gas Engine, whilst being definitely fixed in a proper position to record correctly the pressure in the cylinder during practically the whole of the revolution. It has also the effect of reducing the vibratory oscillation usually shown on diagrams to a very marked degree

Gas Engine Indicator, (as above), with External Spring and fitted with Spring Relief Gear, complete in case, with cock, steel tap, parallel bars and square, and 1 packet of 100 metallic papers, but without springs and scales.

Rs. 470-0 each

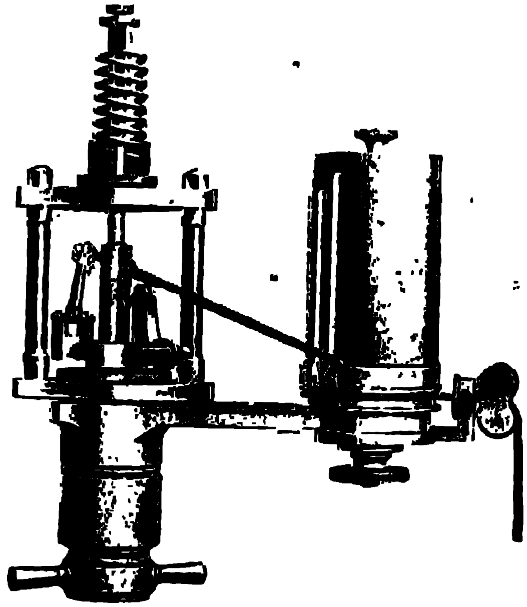
Spare Springs and Scales **17-8**

Crosby "New No. 2" Indicator

For

Steam, Gas and Oil Engines.

The Crosby "New No. 2" Indicator provides, at a low cost consistent with excellence of workmanship and material, an indicator in which the spring is mounted outside the cylinder, where it is removed from any effect of temperature. The spring can be changed without unscrewing the cylinder cap and the pencil lever can be readily adjusted to any desired position on the indicator drum. A Crosby Spherical Piston is fitted, whereby cylinder friction and "sticking" are prevented. For use with Steam Engines the piston supplied is ½ square inch in area, for use with Gas or Oil Engines it is ¼ square inch in area.

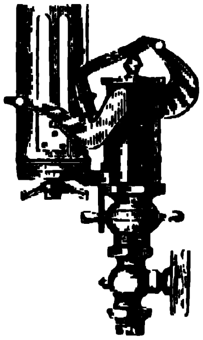


Crosby "New No. 2" Indicator with two pistons and rods, full nickel-plated, mounted in velvet-lined polished walnut box having lock and handle. Complete with one spring and scale, one straight cock, 50 diagram cards, 10 yards of indicator cord, one spring bracket, one cord adjuster, one bottle of oil, one screwdriver, and book of instructions **Rs. 640-0** each

Spare Springs and Scales .. .. „ **24-0** „

Improved Richards' Steam Engine Indicator.

Richards' Improved Type.



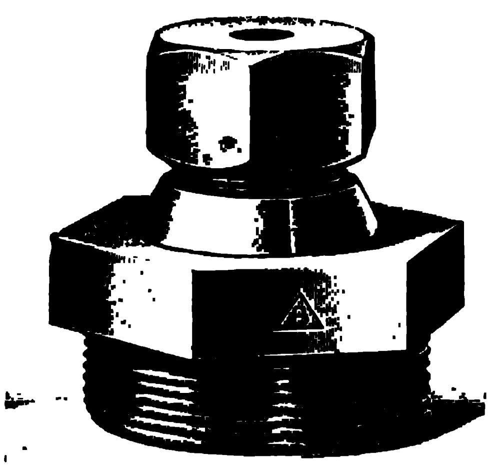
These Indicators are suitable for Steam Engines of all descriptions and will give very satisfactory results where the pressure is low and the speed slow. Though massive in construction the moving system is sufficiently light to prevent the pencil responding to the forced vibrations at all ordinary speeds.

They can also be used for testing safety valves and Steam Pressure Gauges on Boilers.

Indicator in folding teakwood case complete with six Springs and Scales, Spare Drum Spring and Accessories	Rs. 215-0	each
Spare Springs and Scales	„ 14-0	„
Metallic Paper	„ 5-8	packet
Cord	„ 8-0	skein

Bailey's Patent Safety Fusible Plug.

For every type of Steam Boiler.



Fusible Plugs, when they fulfil their object, and are fixed in a proper manner, melt when the water in a steam boiler becomes dangerously low, thus allowing the steam to put the fire out, and thereby preventing danger to the flue plates which would otherwise become, if not red hot, sufficiently so to cause a collapse of a very serious nature.

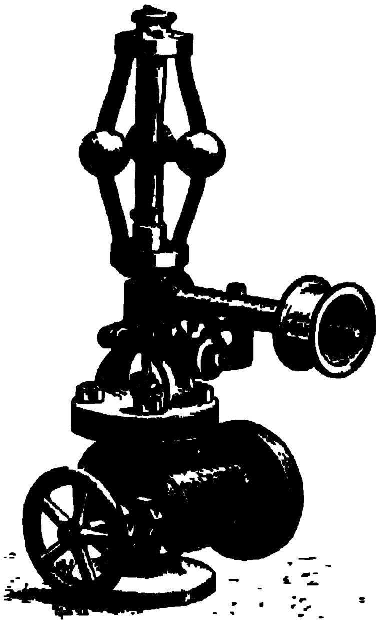
Size. Ins.	¾	1	1¼	1½	2
Price, each **Rs.**	**14**	**15**	**18**	**18**	**22**
Maximum Steam Pressure, in lbs. per square inch.	200	200	200	200	200
Screwed Whitworth Gas thread.	¾	1	1¼	1½	2

Spare Caps 5A **Rs. 26-8** doz.

Gun-Metal Steam Unions.

For Pressures up to 250 lbs.

Size ins.	¾	1	1¼	1½	2	2½	3
Price, each **Rs.**	**3-12**	**5-0**	**7-0**	**9-2**	**12-8**	**26-4**	**33-4**



Pickering High Speed Engine Governors.

These Governors are designed to withstand a working pressure of 160 lbs. per square inch, and are tested to 300 lbs. per square inch pressure before despatch.

They should be fixed as closely as possible to the Steam Cylinder, and great care should be taken, when being fitted into position, not to damage the valve spindle, and thus destroy the sensitive working of the Governor.

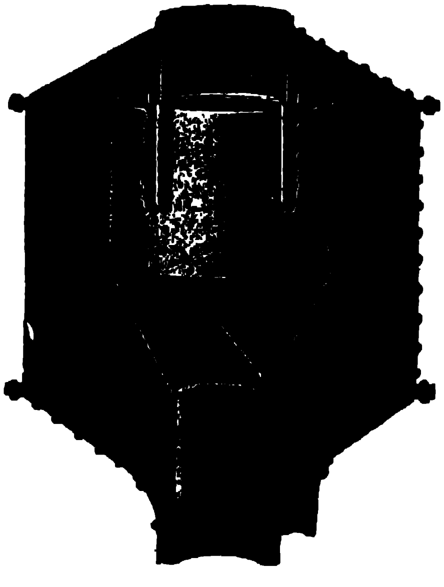
The pulley can be fixed in four different positions.

Before commencing to run the Governor the coil spring should be wound up just sufficiently to lift the Governor valve by means of the spanner provided. After this preliminary adjustment of the tension gear, no attempt should be made to change the speed of the engine by altering the tension or coil spring.

The correct method of changing engine speed is to unscrew the top cap and adjust the small locking nuts as required.

If the engine runs too fast raise the lock nuts or lower them if too slow.

Steam Pipe. Diam. Ins.	1½	2	2½	3	3½	4
Diameter of pulley and width of belt. Ins.	3×1½	3×1½	4×2	5×2½	5×2½	5×2½
Revolutions of pulley per min.	420	420	380	320	320	320
Centre of Governor to centre of pulley. Ins.	8¾ to 10½	8¾ to 10½	10½ to 12¾	12 to 14½	12 to 14½	13 to 16
Diameter of flanges. ,,	5	6	7	7¼	8½	9
Approx. height overall. ,,	24¾	25¾	31½	35¼	37	44
,, weight. lbs.	43	56	89	132	157	222
Governor with Stop Valve. Price, Rs.	**165**	**180**	**225**	**270**	**300**	**365**



Exhaust Heads.

Burt's Patent.

The Burt Exhaust Head is attached to the exhaust pipe and prevents oil and wet steam from escaping.

Its use prevents drenching and disfigurement of the building and corrosion or rotting of the roof, which in the case of iron buildings is of considerable importance.

The water condensed by and in the Exhaust Head (after the oil has been removed) can be returned to the boiler at a high temperature and thereby effecting an economy

They have an ample inside area to allow for expansion, thereby eliminating the possibilities of a back pressure being set up.

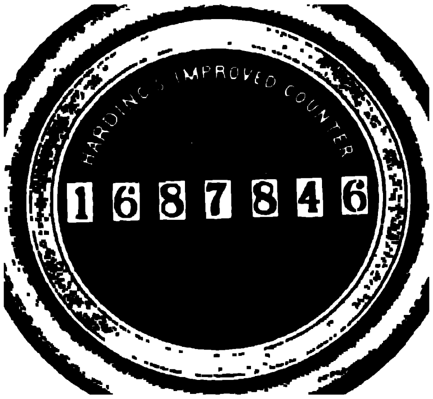
Exhaust Heads are made to suit pipes from 1 inch to 20 inches diameter.

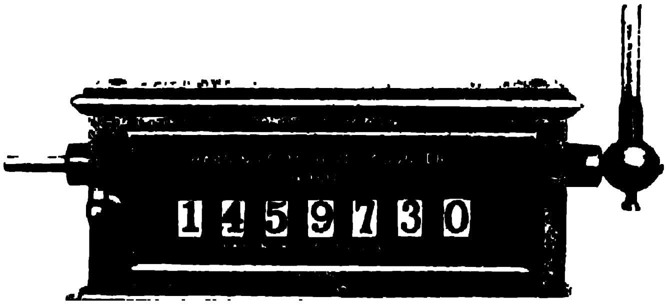
Size of Exhaust Pipe.		Height.	Diameter.	Size of Drip.	**Price**
1 or 1½	Ins.	16 Ins.	10 Ins.	1 In.	**Rs. 60**
2 2½		18 ,,	12 ,,	1 ,,	**,, 75**
3 3½		20 ,,	14 ,,	1 ,,	**,, 90**
4 4½		27 ,,	16 ,,	1 ,,	**,, 120**
5		29 ,,	18 ,,	1¼ Ins.	**,, 150**
6		31 ,,	20 ,,	1¼ ,,	**,, 180**

Prices of larger sizes on application.

Improved Counters.

With Porcelain Figure Wheels.





No. 1. Round Engine Counters.
9 ins. diam., ⅝ in. Figures.
Price, with Porcelain Figure Wheels.
Rs. 145-0.

No. 1A. Square Engine Counter.
10 ins. long, ⅝ in. Figures.
Price, with Porcelain Figure Wheels.
Rs. 145-0.

The No. 1 Counters with ⅝ in. figures are the ones used for Engines of all kinds. They are made in round and rectangular cases with bold and clear figures. The mechanism in these sizes are very solid and durable.

No. 2. Round Engine Counter, 5 ins. diam., Rotary Motion, with six $\frac{5}{16}$ in. Figures—very convenient for General Machinery where No. 1 size might be found too large .. **Rs. 90-0.**

Pocket Counters or Speedometers.

Nickel-plated and fitted in leather case with rubber faced steel bits. .. **Price, Rs. 50-0**

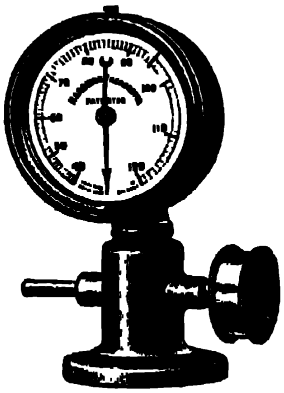
Improved Speed Counter.

For Shafting, etc.

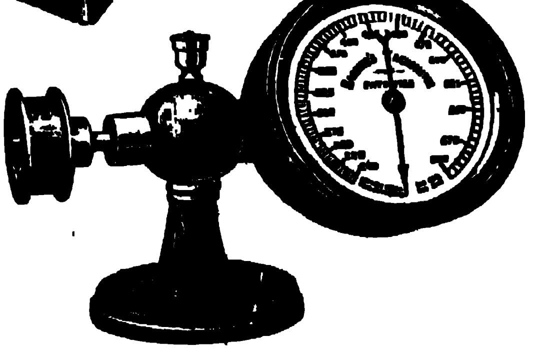
This instrument is simple, neat, and not liable to derangement.

Price **Rs. 10-0**

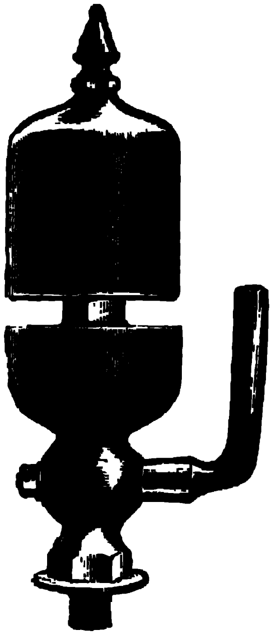
Patent Tachometer or Speed Indicator.



This instrument shows at a glance, without calculation, the exact speed at which an Engine or Shaft is running. It is accurate at all speeds, made with any scale of speeds, and will drive from almost any size of pulley or shaft.



Prices on application.



Ordinary Steam Whistle.

Gun-Metal Steam Whistles.

These Whistles are of the best British manufacture, made of Gun-metal throughout, and highly finished.

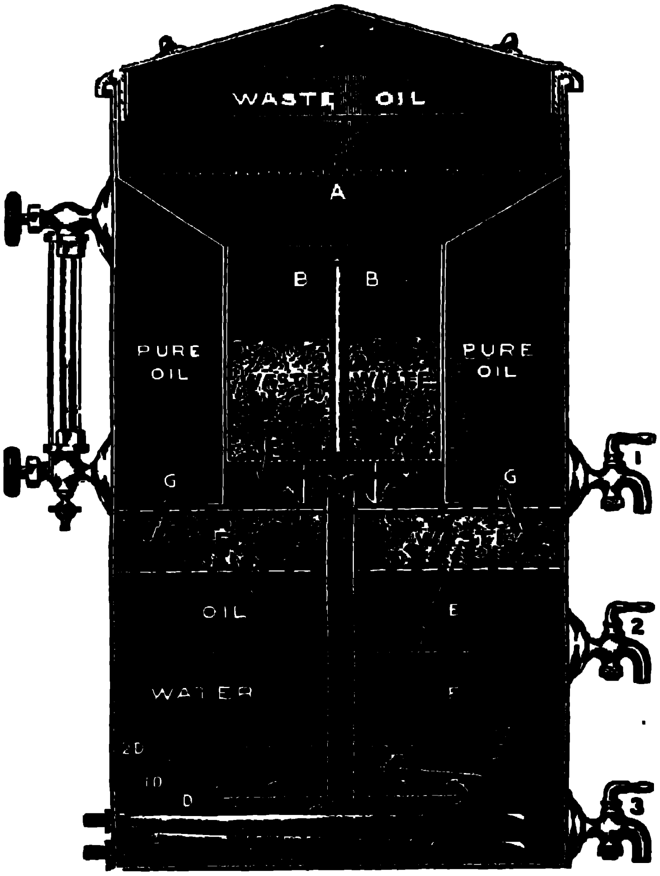
Size .. .. ins.	1½	2	2½
Ordinary Steam Whistle. Price, Rs. ..	8 0	11 0	15 0

Size .. ins. Screwed Gas. ..	1 ½	1½ ½	1⅜ ¾	2 ¾	2½ 1¼
Harmony or Organ Whistle. Price, Rs. ..	19 8	26 4	26 4	35 0	45 0

Bell Chime or Triple Harmony Whistles.

Size, 4 ins. by 1¼ ins., screwed	**Rs. 105-0** each
„ 5 „ „ 1½ „ „	„ **115-0** „

Harmony or Organ Pipe Whistle.



Sectional View.

The Cross Oil Filter.

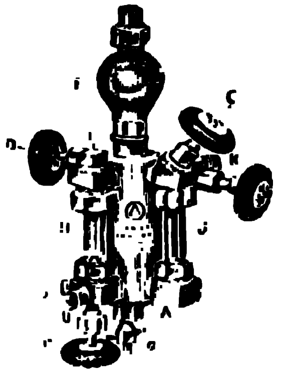
Burt's Patent.

Every user of lubricating oil knows that the larger portion of the oil he buys is not consumed by the machinery on which it is used, but passes through the bearings, drips away and is lost. This waste frequently amounts to from 50 to 90 per cent of the quantity used, but if gathered and passed through a filter, all dirt, grit and other impurities will be eliminated, and the otherwise waste oil can be used over again with perfect safety. By this means, when the price of ordinary lubricating oil is considered, the saving will be appreciated, as the lubricating properties of the oil are not in the least impaired by use and subsequent filtration.

Size No.	Will filter in 24 hours.	**Price.**
No. 1	20 to 30 gallons	**Rs. 205**
„ 2	5 „ 10 „	„ **140**
„ 3	40 „ 50 „	„ **420**

Prices of larger sizes on application.

"Detroit" Sight-Feed Lubricator.



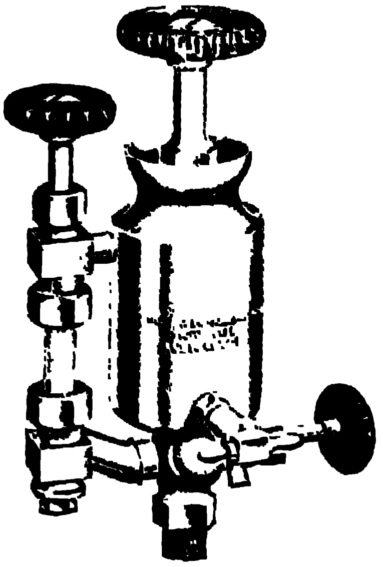
Double Connection.

The double connection type of lubricator can be used on all kinds of steam engines, steam pumps, etc., and is particularly adapted for feeding heavy oils. This type cannot be syphoned out and a steady and regular feed is assured at all times.

Capacity in Pints.		1		
For Cylinders	ins.	Under 10	10 to 12	12 to 18
Screwed Gas	in.	½	½	½
Price	**Rs**	**66-0**	**75-0**	**90-0**

Prices of larger sizes on application.

"Crosby" Sight-Feed Lubricator.



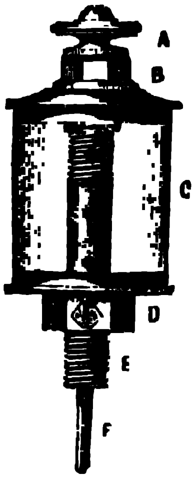
Down Drop Type.

This lubricator is recommended for Engines of every description, on account of its compactness and simplicity

It works by gravity only, the drops of oil are seen falling through the glass into the steam pipe, and conveyed by the steam to every working part of the cylinder.

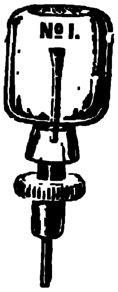
Capacity in Pints.			½	
Screwed Gas	ins.	½ or ¾	¾	¾
	Weight	3-14	6-2	8-0
Price	**Rs.**	**75-0**	**85-0**	**105-0**

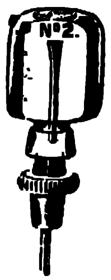
Glass Sight Drop Feed Lubricator.

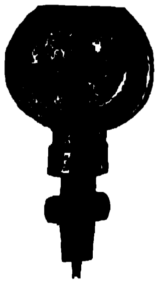


This Oil Cup is made for use on all kinds of stationary bearings, especially for dynamos and engines where the shafts run at high speeds, and require perfect lubrication.

Capacity in Pints.		1/10	⅛	3/16	¼	½	1
Diameter of Glass	ins.	1½	2	2½	3	3½	4
Screwed Gas	in.	¼	⅜	⅜	½	½	¾
Price	**Rs.**	**6-12**	**8-8**	**9-8**	**11-8**	**13-0**	**20-0**

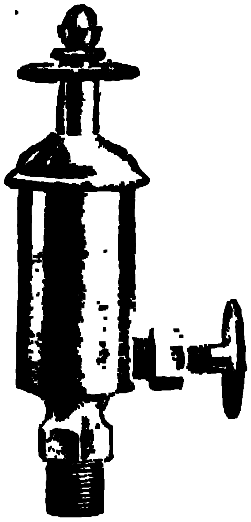






Glass Needle Lubricators.

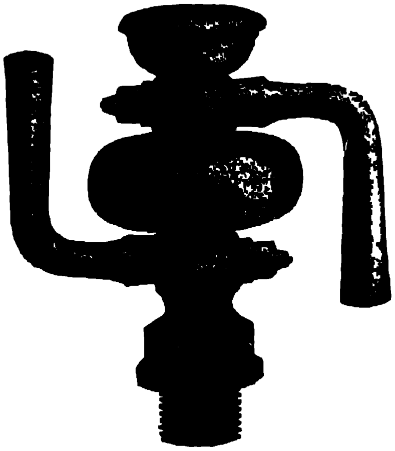
Shape.	Cylindrical.	Flat.				Globe	
Shape number	1	7	4	2	3B	03	02
Capacity in ozs.	2⅝	⅝	1¼	2	3¼	4⅝	6
Price, per doz. Rs.	6-8						



Gun-Metal Suet Lubricators.

These lubricators are fitted with a solid screwed plug top.

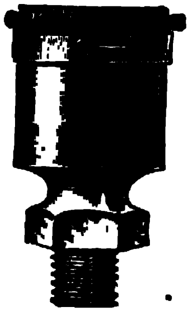
Size . ins.	1½	2	2½	3
Screwed Gas .. in.	⅜	½	½ or ¾	¾
Price . .. Rs.	9-8	14-12	21-8	30-0



Gun-Metal Tallow Cups.

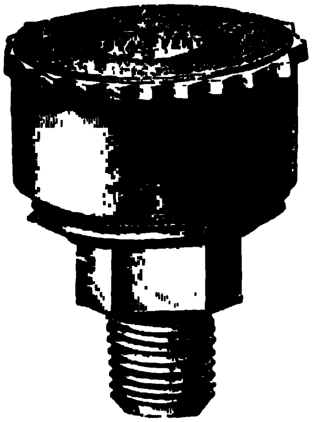
Elliptical and Round Bodies.

Size ins.	1¼	1½	2	2½	3
Screwed Gas . in.	⅜	½	½	½ or ¾	¾
Round Barrel Cocks, Double Pattern. Price, Rs.	7-0	7-8	10-0	13-0	17-8



Gun-Metal Bayonet Top Oil Syphons.

Size .. ins.	1	1¼	1½	2
Screwed Gas .. .. in.	¼	⅜	⅜	½
Price .. .. .. Rs.	2-8	3-4	3-8	5-4



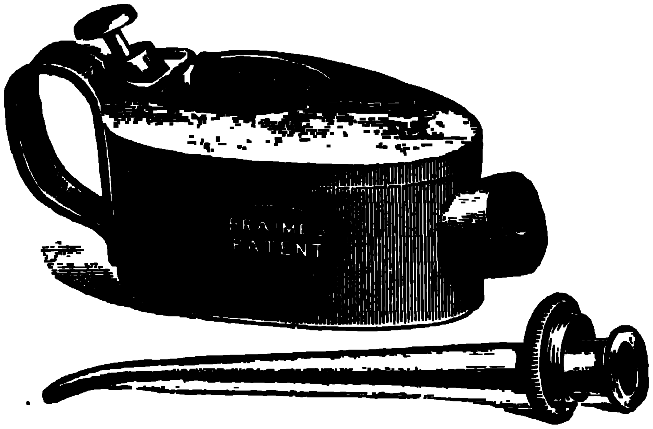
Stauffer's Patent Lubricators.

With unbreakable shank and cogged cup.

Size No.	1	2	3	4	5	6	7	8
Diameter Grease Cup ins.	¾	⅞	1⅛	1½	2	2⅜	2¾	3⅝
Screwed Gas .. in.	⅛	¼	¼	¼	¼	¼	⅜	⅜
Diameter of suitable Shaft ins.	⅝	¾	1¼	1¾	2½	3	4	5
Price, per doz. .. Rs.	**2-8**	**2-14**	**3-4**	**4-0**	**5-8**	**7-8**	**9-8**	**12-0**

Seamless Steel Oil-Cans.

With Patent Feed-hole and Interchangeable Spouts.



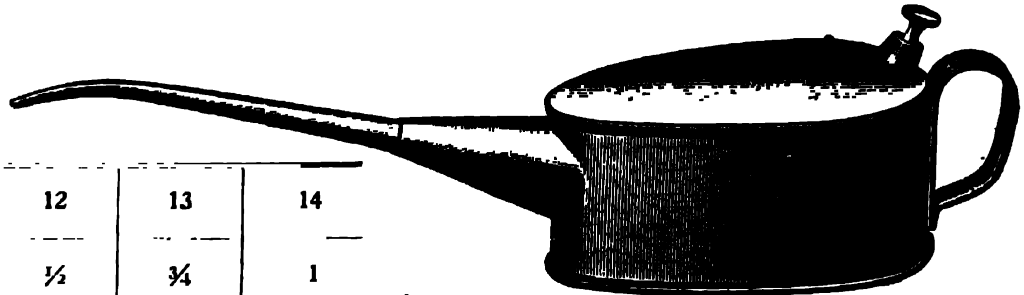
Admiralty Pattern. Fitted with patent double slide grit-excluder Feed-hole. Complete with solid valve and unbreakable springs.

No.	09	011	012A
Capacity .. Pints	½	1	2
Price, each Rs.	**2-0**	**2-14**	**3-14**

Folded Bottom Oil-Cans.

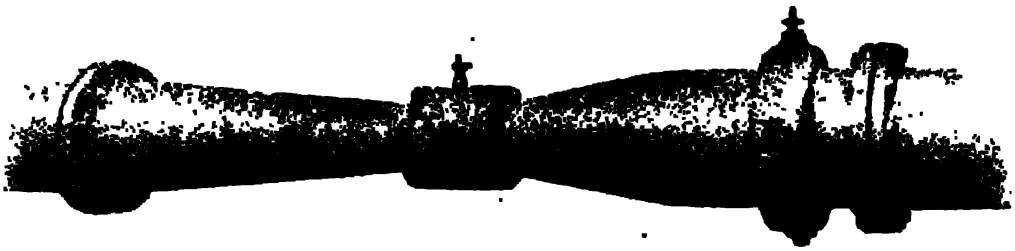
With patent Feed-hole and fitted Spouts. Strong and light. Fitted with double slide grit-excluder Feed-hole.

No.	12	13	14
Capacity .. Pints	½	¾	1
Price, each Rs.	**1-8**	**2-0**	**2-8**



Venturi Meters.

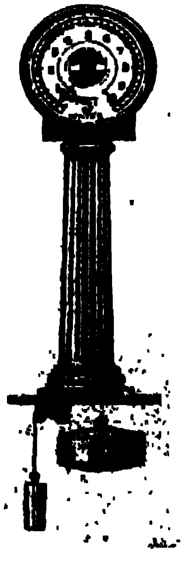
The illustration below is of a Glenfield & Kennedy's Venturi Meter



The construction, principle, and application of the Venturi Meter Tube is well known throughout the world and therefore unnecessary to detail.

As an instrument for the measurement of large quantities of water, sewage, etc., it is unrivalled in accuracy and simplicity. A very significant feature, appreciated by Engineers, is the complete absence of moving parts in contact with the effluent, and therefore any disarrangement of the supply is obviated.

Venturi Meters with and without diagram and counter recorders, suitable for any range of registration, can be supplied on receipt of full particulars.



Water Level Recorders.

The illustration given is of a Glenfield & Kennedy's Water Level Recorder.

Mechanical and Electrical Level Indicators and Recorders of the best design, suitable for shallow and deep wells, reservoirs, filters, etc., can be supplied for recording water levels under any conditions.

The mechanical type are more often employed for recording levels close at hand, and where the apparatus is required some distance from the supply, such as in the case of reservoirs, the electrical type are generally used.

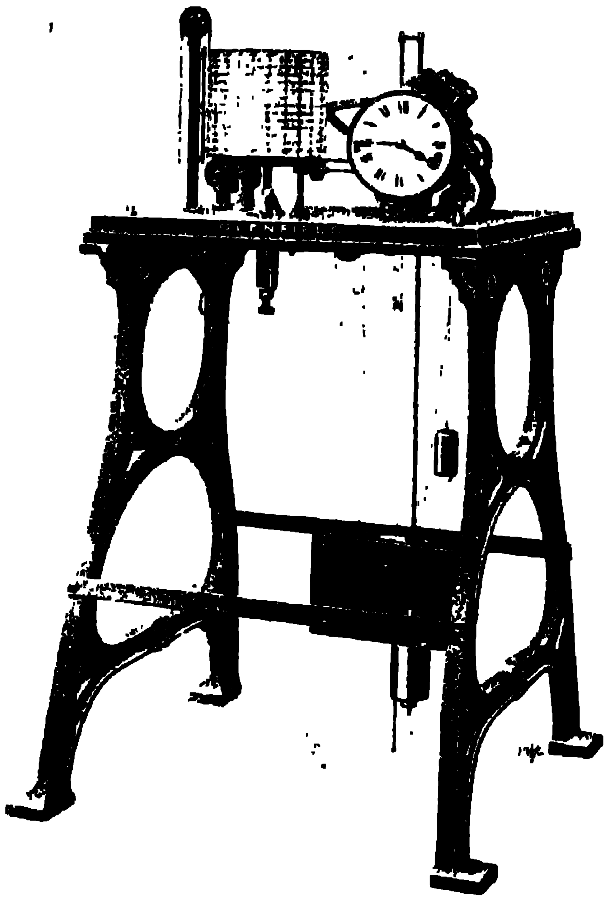
Prices and particulars on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Williamson Patent Integrating Discharge Recorder.



The Williamson Patent Integrating Discharge Recorder is an instrument which has been largely adopted to measure the quantity of water flowing in an open channel, and can be adapted for recording and integrating the flow of water through an orifice.

The usual method of measuring the quantity of water flowing in an open channel is to pass the water over a weir of known dimensions. This involves many calculations, but by installing a Williamson Recorder all such calculations are eliminated and its accuracy of registration is guaranteed to within one per cent.

The advantages of the Williamson Recorder are many and the following will illustrate its great adaptability:—

Gives an instantaneous indication of the quantity of water passing at any given instant.

Integrates the total quantity so that no calculations by planimeter and formulæ are required.

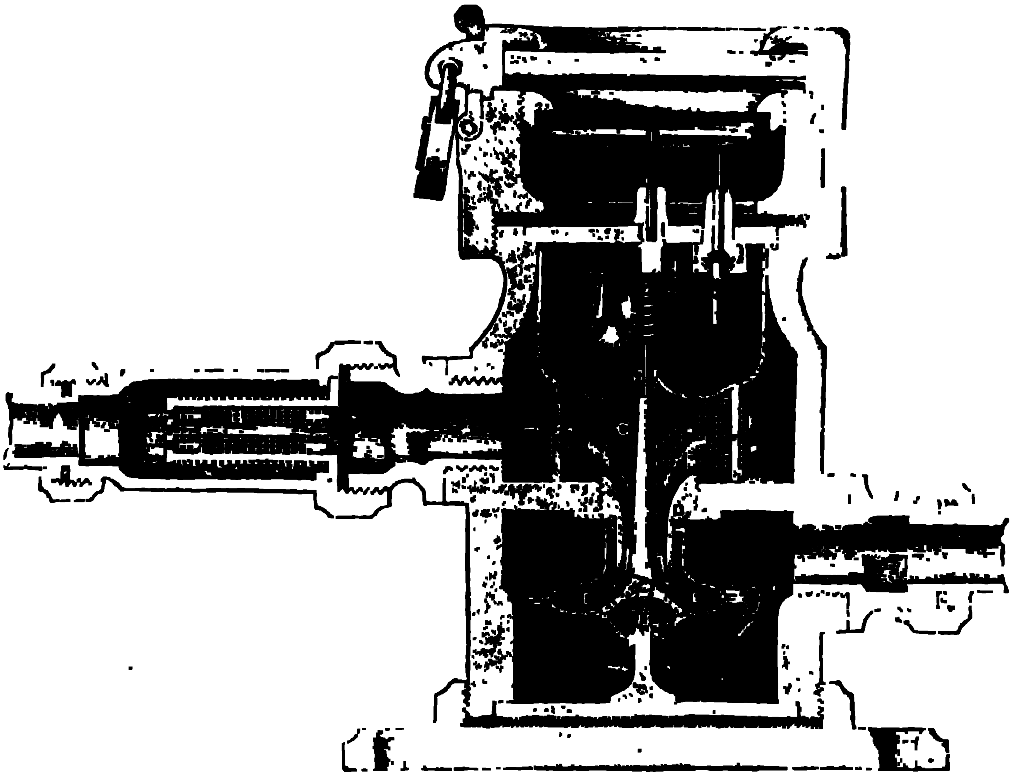
Gives a permanent record of varying discharge.

Gives, if required, a permanent record of the varying height of water passing over the weir.

Is guaranteed accurate to within one per cent. at all rates of flow.

We shall be pleased to furnish prices and full details on receipt of particulars of requirements.

Siemen's Patent Water Meters.



Section view.

The construction of this Meter is based upon the principle of the Barker's Mill, well known as a motive power for working Mills, etc.

Meters up to and including 6 inches diameter are regularly carried in stock, the smaller sizes are fitted with Brass Filters, and from 1 inch diameter and upwards with a Copper Strainer and Dirt Box. Larger sizes, measuring up to 154,000 gallons per hour at an effective head of 150 feet can also be supplied.

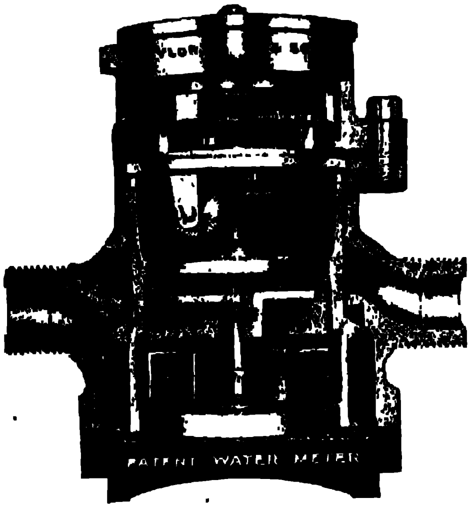
Particulars and Prices.

Size of Meter, *i.e.*, diameter of Inlet and Outlet .. .. Ins.	½	¾	1	1¼	1½
Gallons delivered per hour at an effective pressure of 50 feet	300	600	1,500	2,200	3,000
Gallons delivered per hour at an effective pressure of 150 feet	500	1,000	2,500	3,800	5,000
Price, each with Brass Filters and Unions screwed for Iron Pipe .. .. **Rs.**	**65**	**75**	..	..	..
Price, each with flanged ends for C.-I. Pipes including Dirt Box with Copper Strainer .. .. **Rs.**	..	..	**110**	**140**	**160**

Size of Meter, *i.e.*, diameter of Inlet and Outlet . Ins.	2	2½	3	4	5	6
Gallons delivered per hour at an effective pressure of 50 feet	4,000	6,000	8,300	13,400	18,500	27,000
Gallons delivered per hour at an effective pressure of 150 feet	7,000	10,000	14,000	23,000	32,000	46,000
Price, each with flanged ends for C.-I. Pipe including Dirt Box with Copper Strainer **Rs.**	**215**	**275**	**330**	**440**	**590**	**740**

Particulars and Prices of other types of Meters with Positive Action and Straight Reading dials can be supplied on application.

Tylor's Patent Rotary Water Meter.



The Meter consists of an outer and inner casing which contains the toe-piece, fan and spindle and brakes, complete in itself, and quite independent, as far as the moving parts are concerned of the remainder of the Meter.

The Outer Casing of ⅜ in., ½ in. and ¾ in. sizes is made of brass, exactly to gauge in all respects.

The Inner Casing is made to gauge and may be removed from the Meter by detaching the bottom plate and pulling the inner casing outwards.

The Toe-Piece is fitted into the brake-plate, gauged to fit the bottom of the inner casing, and is made of anti-friction metal, and pointed with specially hard metal which cannot corrode.

The Fan is of phosphor bronze, and is balanced so as to run at high velocities without any noise and has a jewelled bearing. The blades are twisted in opposite directions avoiding the thrust hitherto experienced in fans of this class. The equality of forces, carefully balanced round the axis of the fan prevent any eccentric action in the movement of the Meter which might tend to cause wear and allows the use of an exceptionally small toe-piece and spindle, thus reducing friction, so that every movement of the passing water may be faithfully recorded on the dial. This dial has five hands and is easy to read.

Registering Apparatus or clockwork, which is connected with the worm fixed on the extremity of the spindle, is fixed in a recess in the outer casing and is kept in position by the washer held down by the top. This clockwork consists of a train of wheels, comprising a worm-wheel, intermediate wheel and pinion, with valve-wheel and pinion and communicating with the dial by a valve made tight by washers.

The Meter top is removable by taking out the three screws. The top can be lifted and clockwork removed.

The bottom can also be removed and working parts examined and taken out.

Sizes	½ in.	¾ in.	1 in.	1¼ in.	1½ in.
Prices .. .. Rs.	**60**	**65**	**90**	**132**	**162**

½ in. and ¾ in. Meters are made throughout of brass, gunmetal and phosphor bronze. 1 in. sizes and upwards the outer cases are made of iron and working parts of brass, gunmetal and phosphor bronze. ½ in. and ¾ in. Meter are supplied with union for lead and iron pipe.

Sizes.	2 in.	2½ in.	3 in.	4 in.	6 in.
Prices .. .. Rs.	**255**	**305**	**365**	**488**	**820**

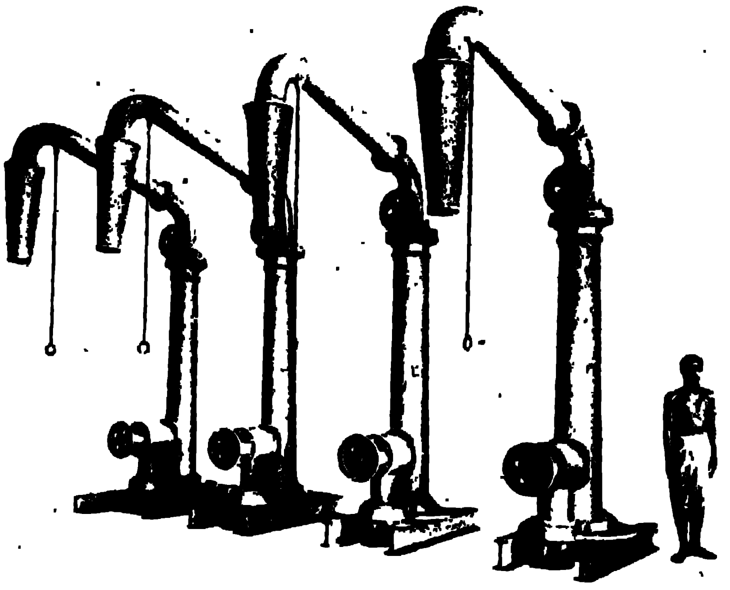
1 in. to 1½ in. Meters are supplied with flanges for lead or iron pipe, and the larger sizes with flanges not drilled. 2 in. sizes and upwards supplied with dirt boxes of iron.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

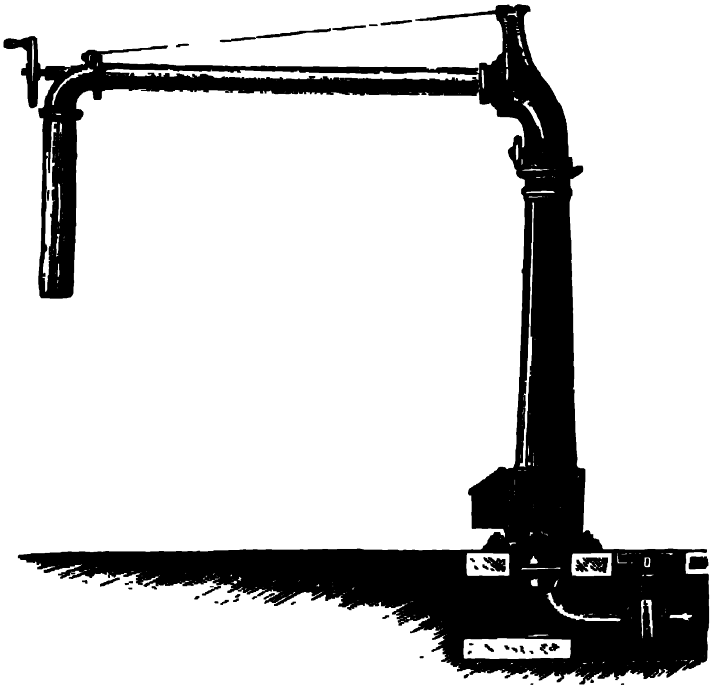
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Locomotive Water Cranes.



The above illustration portrays a few of a large consignment of broad gauge Locomotive Water Cranes recently manufactured in our own Works for the Bengal-Nagpur Railway.



This illustrates one of the types of Water Cranes usually supplied for Light Railway Work. The Crane is supplied complete with Valve and Hose Pipe.

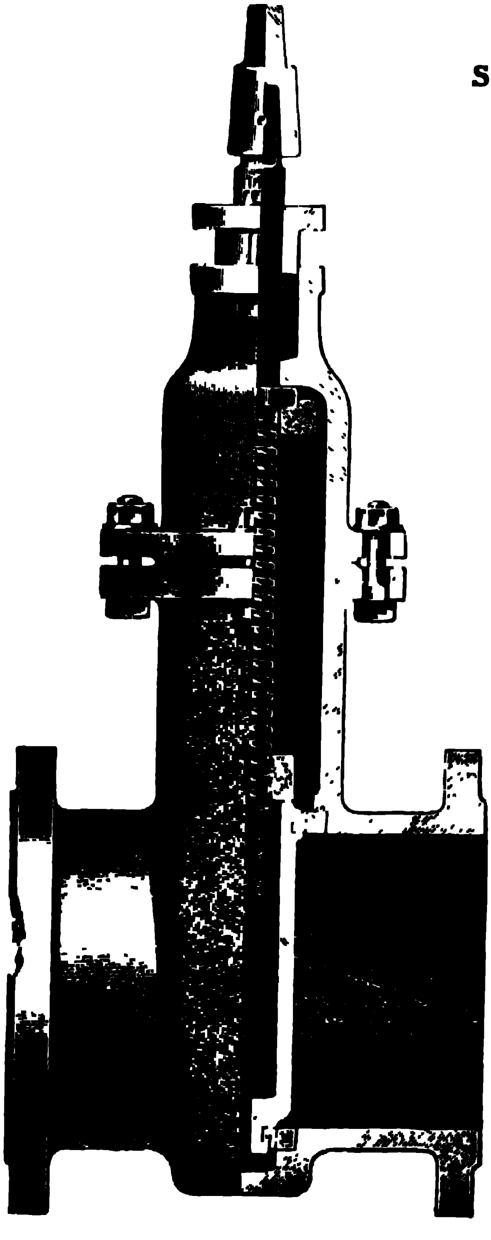
Full Particulars and Prices on application.

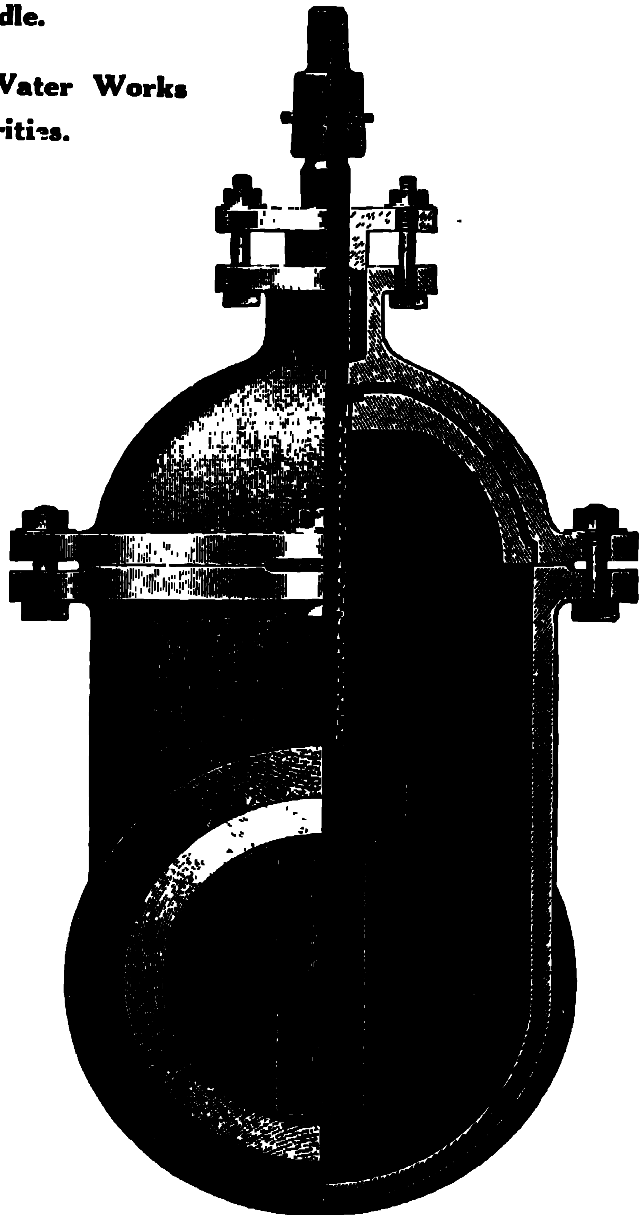
Cast-Iron Sluice Valves.

Tested to 600 ft. Head of Water.

Forged Manganese Bronze Spindle.

Suitable for Water Works Authorities.





The Sluice Valves which we supply are manufactured by leading British makers and sizes up to 18 inches diameter are normally carried in stock. The valves are fitted with Manganese Bronze Spindles and Gun-metal faces, these being accurately scraped to a bearing.

Larger sizes and valves fitted with hydraulic and electrical operating gears can be offered to suit any specified requirements.

Cast-Iron Sluice Valves.

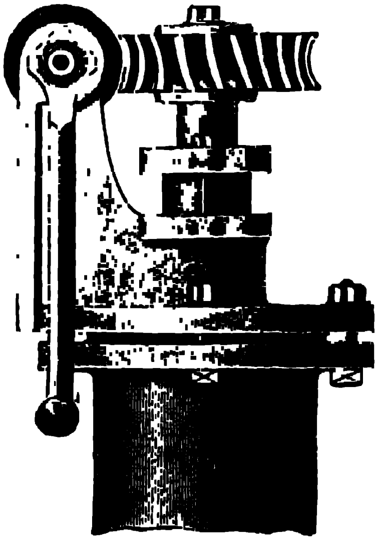
Tested to 600 ft. Head of Water.

Dimensions.

Bore of Valve.	Diameter of Flanges.	Length over Flange.	Centre of Valve to top of Hand-wheel. Inside Screw.	Diameter of Handwheel.	Price.	Socket and Spigot Pieces. Price, extra.
Ins.	Ins.	Ins.	Ins.	Ins.	Rs. A.	Rs. A.
2	6	8	14	9	22 0	8 8
2½	6½	8¼	15	9	27 0	9 0
3	7¼	8½	17	9	33 0	9 12
4	8½	8¾	19½	10¼	45 0	15 8
5	10	10	22	10½	55 0	21 0
6	11	11¼	24	15½	67 0	24 0
7	12	12½	25½	15½	85 0	27 0
8	13¼	13	27½	15½	98 0	32 0
9	14½	13¾	29	19	130 0	45 0
10	16	15	32½	19	150 0	50 0
11	17	16	33	19	170 0	64 0
12	18	17	36½	19	200 0	64 0
13	19¼	17	37	19	250 0	112 0
14	20¼	17¾	38½	24	300 0	112 0
15	21¼	18	42	24	355 0	120 0
16	22¼	18	43	24	390 0	120 0
18	25¼	19	47	24	475 0	155 0

Prices and Dimensions of Larger Sizes on Application.

Sluice Valves are supplied without handwheels, but these can be fitted for a small extra charge.

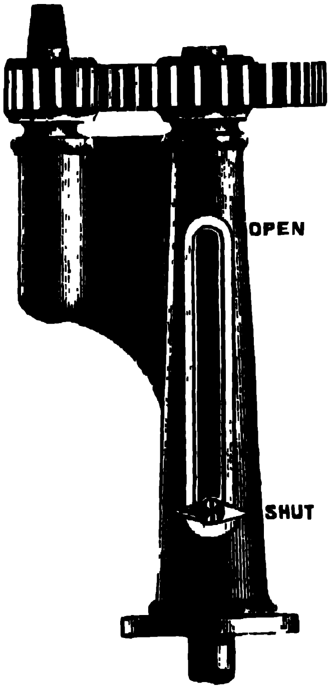


Worm Gear.

Gearing for Valves.

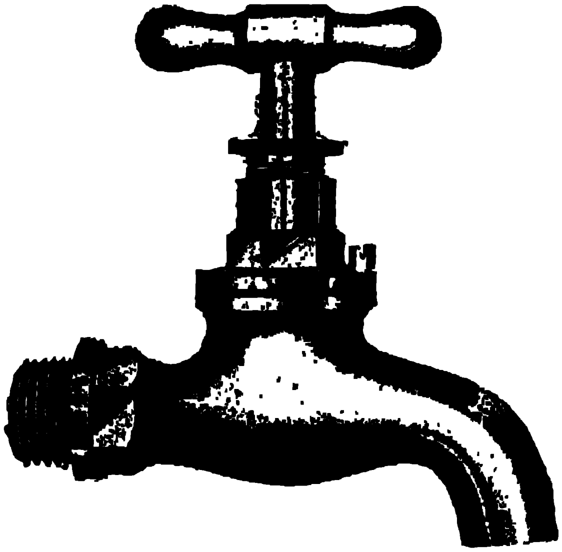
Gearing and Indicators for Sluice Valves for opening valves in vertical or horizontal positions can be supplied to suit any size of valve.

Prices on application.



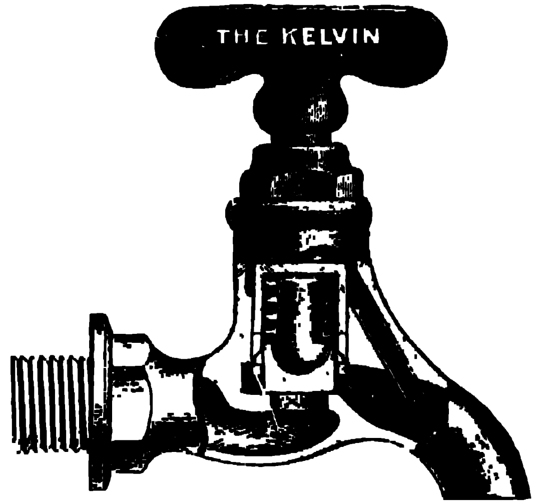
Spur Gear on Column.

Brass Screw Down Bib Cock.



Size	Ins.	½	¾	1
Price	**Rs.**	**1-12**	**2-8**	**4-8**

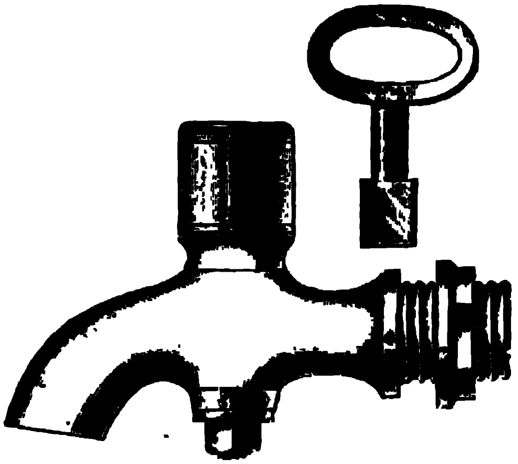
Lord Kelvin's Brass Bib Cock.



Size			¾	
Price	**Rs.**	**6-12**	**9-8**	**14-0**

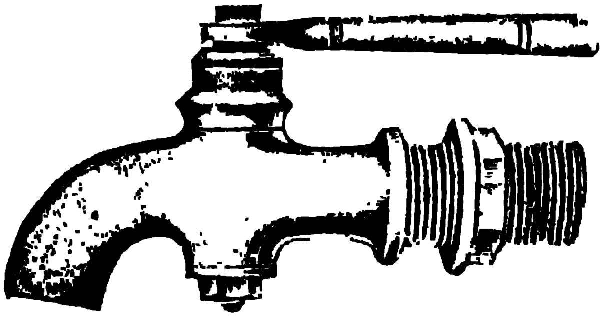
Brass Bib Cock For Oil Tank.

With Loose Key.



Size	Ins.	½	1
Price	**Rs.**	**4-0**	**6-8**

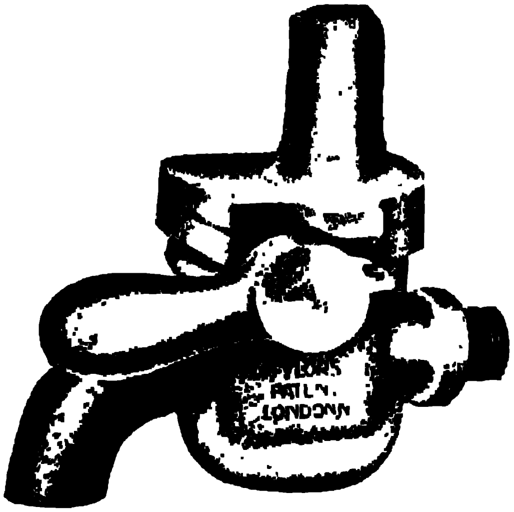
Brass Range Cock.



Size	Ins.	½	¾	1	1¼	1½
Price	**Rs.**	**2-8**	**4-0**	**6-0**	**9-0**	**13-0**

Tylor's Galvanized "Waste-Not" Cock.

Fig 198/15.



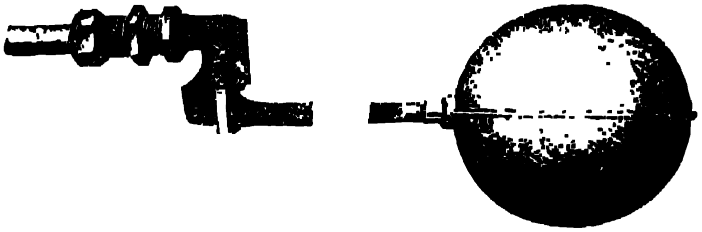
This valve is so constructed that it cannot be tampered with, and is fitted with an automatic arrangement, which closes unfailing, even if the handle be tied or propped. It cannot be made to run continuously, but closes when a given quantity of water has been delivered, usually 2 to 3 gallons, and to obtain more water the handle must be released.

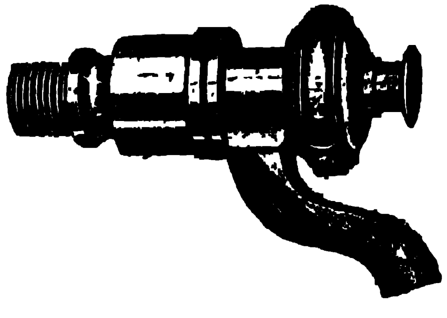
The valve can be adjusted to suit varying purposes and deliveries.

Size	In.	½	¾	1
Fig 198/15				
Price	**Rs.**	**17-0**	**17-0**	**17-0**

Copper Ball Valves.

Brass Self-Closing Spring Push Cock.

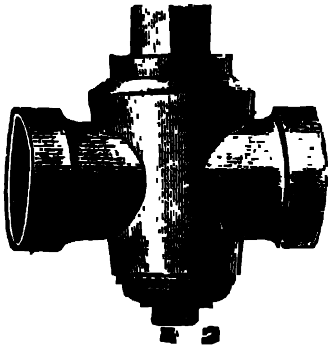




Size	Ins.	½	¾		1¼	1½	2
Price	**Rs.**	**2-8**	**3-8**	**5-0**	**8-8**	**14-0**	**20-0**

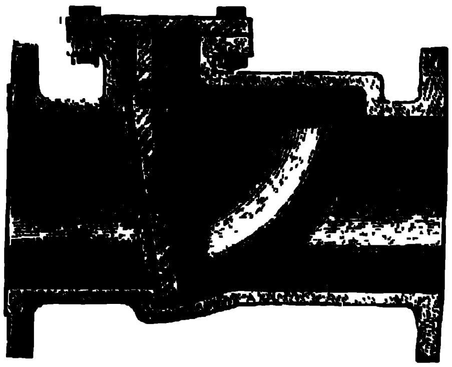
Size	In.	½		
Price	**Rs.**	**4-0**	**5-8**	**8-0**

Cast-Iron Main Cocks.



Size	Ins.	½	¾	1	1¼	1½	1¾	2	2¼	2½	3	3½	
All Cast-Iron.													
Price	**Rs.**	**1-4**	**1-8**	**2-0**	**2-8**	**3-0**	**3-8**	**4-0**	**6-0**	**8-0**	**11 0**	**16-8**	**20-0**
Cast-Iron Body with Brass Plug.													
Price	**Rs.**	**1-10**	**2-4**	**3-4**	**4-8**	**6-0**	**7-8**	**10-0**	**14-0**	**18-0**	**33-0**	**42-0**	**57-0**

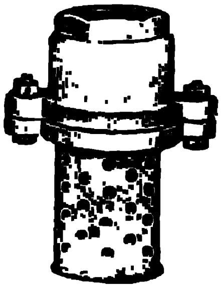
Reflux or Retaining Valves.



For water mains having different levels, also for sewage mains where the sewage is pumped to a higher level.

Diam. of valve Ins	2	3	4	5	6	7	8	9	10	12
Gun-Metal Faces and Gun-Metal Hinge Bolt . Rs.	40	50	70	86	105	130	160	180	225	270
Cast-Iron Faces and W.-Iron or Steel Hinged Bolt Rs.	35	45	60	75	90	115	140	160	195	240

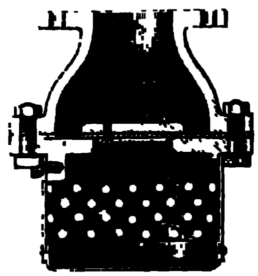
Cast-Iron Foot Valves and Strainers.



Screwed ends. Fig.

FIG. 1. All Cast-Iron with screwed ends to fit into Suction Pipe Suitable for small hand pumps.

FIG. 2. All Cast-Iron with flanged ends. Suitable for large hand and power pumps.

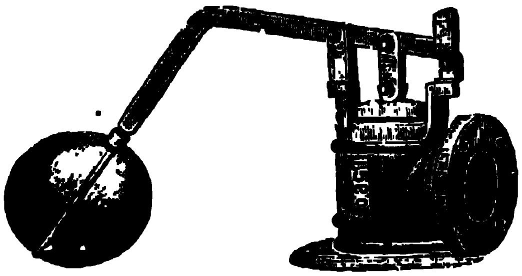


Flanged ends. Fig. 2.

Size Ins.	1¼	1½	2		4	5	6	7		9	10	12
Fig. 1. Price, Rs.	7-0	8-0	9-0	12-0	13-0	18-0						
Fig. 2.				30-0	35-0	50-0	65-0	85-0	100-0	125-0	145-0	170-0

Outlet Control Valves.

With Copper Ball Float.

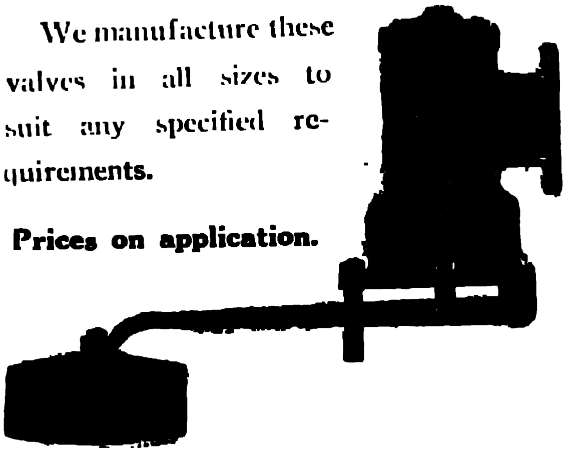


Size Ins.	3	4	6	8
Price Rs.	100	135	205	245

Equilibrium Water Valves.

We manufacture these valves in all sizes to suit any specified requirements.

Prices on application.

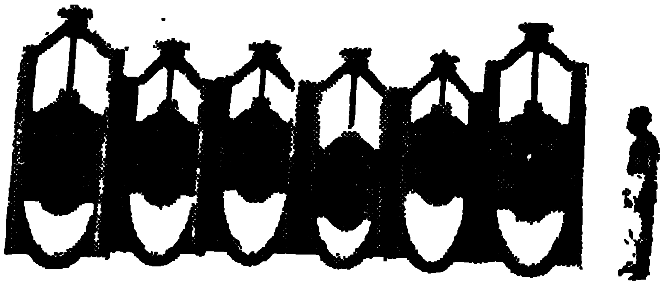


CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

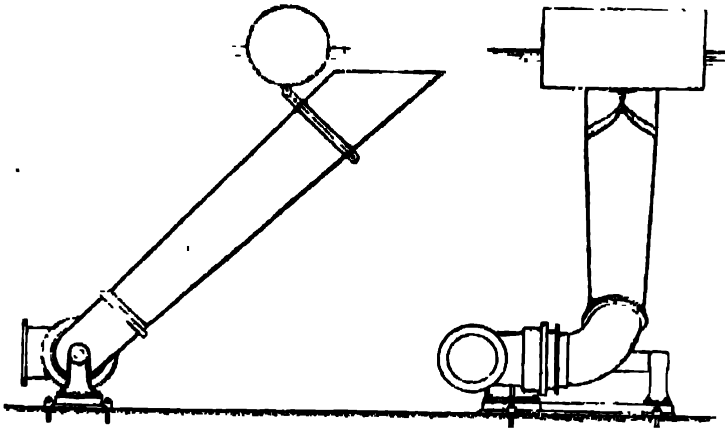
Penstocks and Sluice Gates.



Penstocks and Sluice Gates of any desired size and shape, with machined faces, to open either upwards or downwards by means of worm and rack or mild steel screw through a gun-metal nut are manufactured to suit the constituents' requirements.

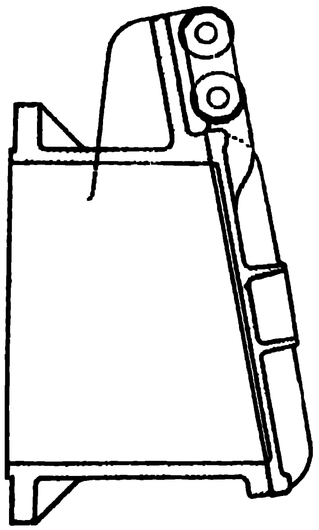
Designs and Estimates on application.

Drainer for Drawing Off Clear Liquid from Settling Tanks.



Drainers for drawing off clear liquid from the top of Settling Tanks can be manufactured in our own works to suit any depth of tank and give the required delivery.

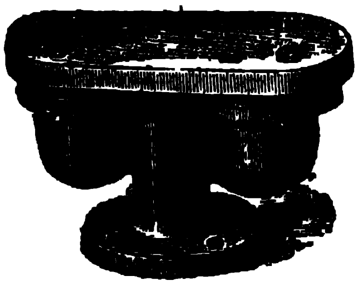
Flap Valves.



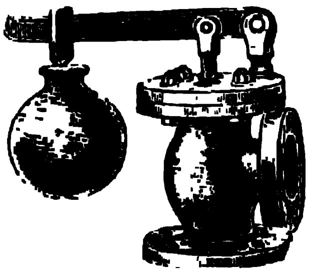
Flap Valves of any **desired size** and shape are manufactured to **constituents' specifications.**

Air Valves.

Single or Double.



Relief Valves.



Particulars and Prices on application.

Cast-Iron Pipes and Specials.

Manufactured by

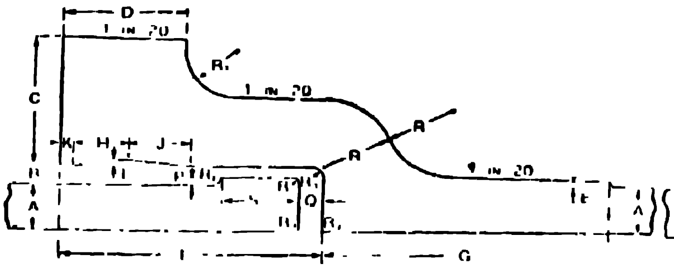
The Stanton Iron-Works Company, Limited, near Nottingham.

Particulars of Straight Socket and Spigot and Flanged Pipes and one or two of the more important Specials, such as Bends and Tees, are given below and on the following pages. We shall be pleased to furnish dimensions, approximate weights and quotations for Pipes and Specials of larger sizes other than those given and for other Specials and Special Specials on receipt of detailed specification.

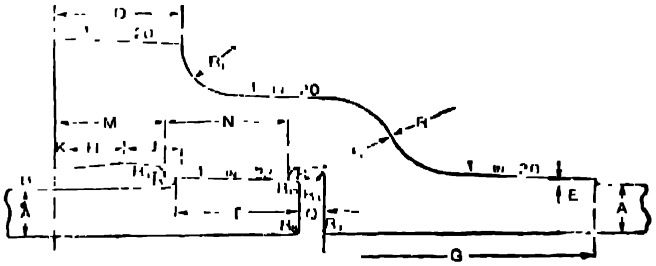
Cast-Iron Pipes for Gas, Water and Sewage.

Socket and Spigot.

Straight Pipes.



Plain



Half-Turned and Bored.

Nominal Bore.	Thickness.	External Diameter.	Socket Diameter. Inside	Socket Diameter. Outside.	Depth of Socket.	Diameter of Spigot.	Weight per Length. 9 feet.	Weight per Length. 12 feet.	Price, per cwt.
Ins.	Ins.	Ins.	Ins.	Ins.		Ins.	cwts.	cwts.	Rs. A.
3	·38	3·76	4·51	6·51	3·0	4·14	1·15		13 12
4	·39	4·80	5·55	7·55	3·0	5·18	1·54	1·98	13 4
5	·41	5·90	6·65	8·90	3·5	6·28	2·04	2·62	13 0
6	·43	6·98	7·73	10·23	3·5	7·36	2·55	3·28	12 14
7	·45	8·06	8·81	11·31	3·5	8·44	3·08	3·98	12 10
8	·47	9·14	9·89	12·52	4·0	9·52	3·71	4·79	
9	·49	10·20	10·95	13·76	4·0	10·58	4·33	5·58	12 12
10		11·26	12·01	14·95	4·0	11·64	5·06	6·52	
12		13·14	13·89	17·14	4·0	13·52	6·42	8·30	12 10
14	·61	15·22	15·97	19·47	4·5	15·60	..	10·39	12 12
15	·63	16·26	17·01	20·57	4·5	16·64	..	11·44	
16	·65	17·30	18·05	21·71	4·5	17·68	..	12·56	13 8
18	·69	19·38	20·26	24·19	4·5	19·76	..	15·05	
20	·73	21·46	22·34	26·46	4·5	21·84	..	17·60	
21	·75	22·50	23·38	27·63	4·5	22·88	..	18·96	
22	·77	23·54	24·42	28·79	5·0	23·92	..	20·57	
24	·80	25·60	26·48	31·01	5·0	25·98	..	23·25	

The above figures are British Engineering Standard for Class B Pipes.

The standard lengths of Socket and Spigot Pipes are exclusive of the internal depths of the sockets and subject to the permissible variation in length.

The weights are subject to the permissible deviation of ±1½ per cent to +4 per cent.

The test pressures for Class B is 174 lbs. per square inch or 400 feet head.

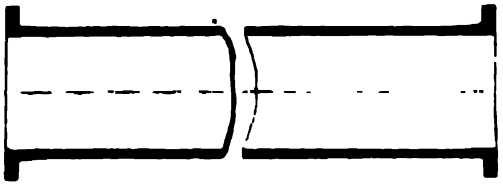
All pipes are coated with Dr. Angus Smith's composition

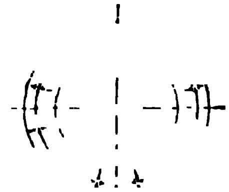
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Cast-Iron Pipes for Water and Steam.





Flanged Straight Pipes.

Nominal Bore. Ins.	Pipes.		Flanges				Weight per length.		Weight of Flange lbs
	Thickness. Ins	Ext. Diam. Ins.	Thickness. Ins.	Ext Diam. Ins	Number of Bolts	Diam. of Bolts.	9 feet. cwts.	12 feet. cwts.	
3	·38	3·76	¾	7¼	4	⅝	1·10	..	6·81
4	·39	4·80	⅞	8½	4	⅝	1·48	1·93	9·98
5	·41	5·90	⅞	10	8	⅝	1·93	2·53	12·84
6	·43	6·98	⅞	11	8	⅝	2·42	3·16	14·39
7	·45	8·06	1	12	8	⅝	2·92	3·82	17·88
8	·47	9·14	1	13¼	8	⅝	3·49	4·56	20·86
9	·49	10·20	1	14½	8	⅝	4·07	5·32	24·11
10	·52	11·26	1	16	8	¾	4·82	6·28	28·89
12	·57	13·14	1	18	12	¾	6·12	8·01	33·40
14	·61	15·22	1	20¾	12	⅞	.	10·04	42·92
15	·63	16·26	1	21¾	12	⅞		11·06	45·23
16	·65	17·30	1 1/16	22¼	12	⅞	.	12·16	50·14
18	·69	19·38	1 1/16	25¼	12	⅞	..	14·51	60·27
20	·73	21·46	1⅛	27¾	16	⅞	.	16·20	74·11
21	·75	22·50	1⅛	29	16	⅞	..	18·43	80·23
22	·77	23·54	1 3/16	30	16	1	..	19·82	86·28
24	·80	25·60	1 3/16	32½	16	1	..	22·48	100·26

The above figures are British Engineering Standard for Class B Pipes

The standard lengths of Flanged Pipes are measured over the flanges and are subject to the permissible riations in length.

The weights are subject to the permissible deviation of + 1½ per cent. to − 4 per cent.

The above weights do not include those of the Flanges

The test pressure for Class B is 174 lbs. per square in h or 400 feet head.

Weights of Miscellaneous Socket and Spigot Standard Specials in cwts. Classes A and B.

Nominal Bore. Ins.	Bends.		Duck Foot Bends	45° Angle Branches	Tees.	Collars	Caps.	Plugs.
	90°	45°						
3	·37	·41	·48	·84	·74	·29	·14	·05
4	·54	·54	·73	1·12	·99	·38	·20	·07
5	·74	·79	1·01	1·54	1·38	·56	·29	·11
6	1·04	·99	1·44	1·94	1·69	·71	·39	·14
7	1·27	1·24	1·78	2·37	2·05	·81	·47	·19
8	1·75	1·55	2·39	2·93	2·69	1·10	·65	·24
9	2·06	1·88	2·84	3·44	3·15	1·25	·75	·29
10	2·70	2·22	3·61	4·80	3·77	1·38	·88	·37
12	3·51	2·96	4·80	6·29	4·74	1·99	1·10	·50
14	4·46	3·95	6·16	8·03	6·42	2·64	1·46	·70
15	5·24	4·47	7·16	8·91	7·09	2·80	1·60	·79
16	5·75	4·90	7·93	10·49	7·75	3·07	1·79	·89
18	6·93	6·12	9·88	13·50	10·17	3·78	2·31	1·12
20	8·62	7·47	11·98	15·85	11·80	4·30	2·71	1·38
21	9·88	8·30	13·67	17·46	12·70	4·62	2·97	1·52
22	11·51	9·25	16·08	20·08	14·86	5·53	3·71	1·74
24	13·71	10·74	19·11	23·08	16·77	6·14	4·00	2·05

Stanton-de-Lavaud "Spun" Iron Pipes.

The Stanton Iron Works Co., Ltd., are now making Stanton-de-Lavaud "Spun" Iron Pipes and we venture to draw the reader's attention to the following interesting points:—

1. These "Spun" Iron Pipes are approximately 25 per cent. thinner than the ordinary Sand Cast Pipe; but due to the centrifugal action in manufacture, the "Spun" Iron Pipe is more than equivalent in strength and has a higher factor of safety than the thicker Sand Cast Pipe.

2. Owing to the great economy in cost of production and saving in material, these pipes can be supplied at a lower price than ordinary Sand Cast Pipes.

3. The "Spun" Iron Pipe is uniform in thickness, solid in structure, of high tensile strength, and free from blow holes, cold shot, sandholes, and other possible defects difficult on occasions to avoid in the Sand Cast Pipe.

4. Tests already made prove that the "Spun" Iron Pipe is some 70 per cent. stronger in tensile than the Sand Cast Pipe. The Pipes have also been subjected to external crushing tests, the results of which show that the thinner "Spun" Iron Pipe has a higher resistance than the thicker Sand Cast Pipe.

5. The Tensile test gave a result of 14 tons per square inch, as against 9½ tons for the ordinary Sand Vertically Cast Pipe. Transverse tests have also been carried out, and a bar 1"×⅜" cut from a "Spun" Pipe on 12" supports broke at an average of 150 lbs., with a deflection of 14". This is equal to a modulus of elasticity of 18,000,000, which equals a load of 44 cwts., on a 2"×1" bar on 3 feet supports.

6. For Sand Cast Pipes, the British Standard Specification makes allowance for irregularities in thickness to give the required factor of safety. The method of manufacturing the "Spun" Iron Pipes ensures uniform thickness.

7. The form and general dimensions of the "Spun" Iron Pipes with plain Sockets and Spigots follow the British Standard Specification, with the exception that there is no bead on the spigot end of the pipe. The external diameter of the pipe and the internal diameter of the socket are made to British Standard dimensions, with the result that existing Sand Cast Pipes and standard connections can be used in conjunction with these "Spun" Iron Pipes. The nominal bore, however, of the "Spun" Iron Pipes will be slightly increased in consequence of the reduction in the thickness of the pipe.

8. It can safely be claimed that the "Spun" Iron Pipe, in consequence of the greater density of its material, is less liable to corrosion than the ordinary Sand Cast Pipe.

Stanton-de-Lavaud "Spun" Iron Pipes.

Below is a table showing the comparison of weights between ordinary Cast-Iron Socket and Spigot Pipes made to British Standard Specification Class "B" and Socket and Spigot "Spun" Iron Pipes.

Nominal Bore.	Weight of Sand Cast-iron Pipes 12 ft. length			Weight of "Spun" Iron Pipes, 12 ft. length			"Spun" Pipe lighter by
Ins.	C.	Q.	Lbs.	C.	Q.	Lbs.	
4	1	3	26	1	2	7	24·52%
5	2	2	14	2	0	7	25·16%
6	3	1	4	2	2	14	23·91%
7	3	3	26	3	0	7	24·66%
8	4	3	4	3	2	21	24·26%
9	5	2	9	4	1	7	24·80%
10	6	2	2	5	0	0	25·21%
12	8	1	6	6	1	14	24·73%
14	10	1	15	8	0	0	25·88%
15	11	1	21	8	3	0	24·08%

The following are the sizes and prices of the "Spun" Iron Socket and Spigot Pipes being supplied to B.S.S. Class "B" pressure, and which, for reasonable quantities, can be delivered from stock:—

Diam.	Thickness.	Length.	Weight.			Price, each.		Diam.	Thickness.	Length.	Weight			Price, each.	
Ins.	Ins.	Feet.	C.	Q.	Lbs.	Rs.	A.	Ins.	Ins.	Feet.	C.	Q.	Lbs.	Rs.	A.
4	·30	12	1	2	7	24	0	9	·37	12	4	1	7	60	4
5	·31	12	2	0	7	29	8	10	·39	12	5	0	0	70	4
6	·33	12	2	2	14	36	6	12	·44	12	6	1	14	89	4
7	·34	12	3	0	7	43	12	14	·46	12	8	0	0	112	8
8	·36	12	3	2	21	52	8	15	·47	12	8	3	0	121	8

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** **RANGOON, MADRAS, BOMBAY, LONDON.**

Seamless Copper Tubes.

To British Standard Specification No. 24—1911.

External Diameter .. Ins.		⁵⁄₁₆	⅜	½	¾	1	1½	1¾	2¼	4⅞
Thickness ..	S W G.	16	14	14	12	12	8	8	8	5
	Ins.	·064	080	080	·104	·104	·160	·160	·160	·212
Price, per lb. ..	.. **Rs.**	**1-14**	**1-14**	**1-14**	**1-12**	**1-12**	**1-12**	**1-8**	**1-8**	**1-8**

Internal Diameter	Ins			⅛	½	⅝	¾		
Thickness	S.W G.	16	12	10	10	10	10	10	10
	Ins.	·064	·104	·128	·128	·128	·128	·128	·128
Price, per lb.	.. **Rs.**	**1-14**	**1-14**	**1-14**	**1-14**	**1-12**	**1-12**	**1-12**	**1-12**

Other sizes from ⅛ in. to 12 ins diameter and varying from 1 to 24 S.W G can be supplied.

Prices on application.

Seamless Brass Tubes.

Seamless Brass Tubes can be supplied in all sizes from ⅛ in to 9 ins. external diameter and varying in thickness from 1 to 24 S.W G. suitable for Condenser and Boiler Tubes

Prices on application.

British Standard Flanges.

TABLE 1.
Low-Pressure Standard
Steam up to 55 lbs. Water up to 200 lbs.

Bore of Valve.	Diam. of Flanges.	Diam. of Bolt Circle.	No. of Bolts.	Diam. of Bolts.	Bore of Valve.	Diam. of Flanges.	Diam. of Bolt Circle.	No. of Bolts.	Diam. of Bolts.
½"	3¾"	2⅝"	4	½"	7"	12"	10¼"	8	⅝"
¾"	4"	2⅞"	4	½"	8"	13¼"	11½"	8	⅝"
1"	4½"	3¼"	4	½"	9"	14½"	12¾"	8	⅝"
1¼"	4¾"	3 7/16"	4	½"	10"	16"	14"	8	¾"
1½"	5¼"	3⅞"	4	½"	12"	18"	16"	12	¾"
2"	6"	4½"	4	⅝"	14"	20¾"	18½"	12	⅞"
2½"	6½"	5"	4	⅝"	15"	21¾"	19½"	12	⅞"
3"	7¼"	5¾"	4	⅝"	16"	22¾"	20½"	12	⅞"
3½"	8"	6½"	4	⅝"	18"	25¼"	23"	12	⅞"
4"	8½"	7"	4	⅝"	20"	27¾"	25¼"	16	⅞"
5"	10"	8¼"	8	⅝"	21"	29"	26½"	16	⅞"
6"	11"	9¼"	8	⅝"	24"	32½"	29¾"	16	1"

TABLE 2.
High-Pressure Standard.
Steam up to 225 lbs

Bore of Valve.	Diam. of Flanges.	Diam. of Bolt Circle	No. of Bolts	Diam. of Bolts.	Bore of Valve.	Diam. of Flanges.	Diam. of Bolt Circle	No. of Bolts.	Diam of Bolts.
½"	3¾"	2⅝"	4	½"	7"	13¼"	11½"	12	¾"
¾"	4"	2⅞"	4	½"	8"	14½"	12¾"	12	¾"
1"	4¾"	3 7/16"	4	⅝"	9"	16"	14"	12	⅞"
1¼"	5¼"	3⅞"	4	⅝"	10"	17"	15"	12	⅞"
1½"	5½"	4⅛"	4	⅝"	12"	19¼"	17¼"	16	⅞"
2"	6½"	5"	4	⅝"	14"	21¾"	19½"	16	1"
2½"	7¼"	5¾"	8	⅝"	15"	22¾"	20½"	16	1"
3"	8"	6½"	8	⅝"	16"	24"	21¾"	20	1"
3½"	8½"	7"	8	⅝"	18"	26½"	24"	20	1⅛"
4"	9"	7½"	8	⅝"	20"	29"	26½"	24	1⅛"
5"	11"	9¼"	8	¾"	24"	30"	27½"	24	1⅛"
6"	12"	10¼"	12	¾"	24"	33½"	30¾"	24	1¼"

Holes for ½ in., bolts ⁹⁄₁₆ in., ⅝ in., bolts ¹¹⁄₁₆ in. All sizes above ⅝ in., holes ⅛ in. larger than bolts. All Holes off Centre Lines.

For steam between 225 and 325 lbs. the diam. of bolts for 2 ins. bore and upwards is increased ⅛ in. All other particulars the same as for 225 lbs.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Victaulic System of Piping.

In all systems of piping the type of joint used is of the first importance—hence, during the course of years and especially since the introduction of wrought-iron and steel piping, many different forms of joints have been evolved to solve the various problems associated with pipe jointing.

The Victaulic joint—the basis of the Victaulic system of piping—differs in construction from other types in so far that it embodies the principle of the hydraulic "U" washer, the self-sealing properties of which have been recognised for so long.

The construction of the Victaulic joint is of extreme simplicity consisting of two metal "half-housings" bolted together and enclosing a leak-proof, flexible, inner ring, the material of which is varied according to the fluid within the pipe. The housing fits closely over the flexible ring and takes the whole of the stress due to pressure. There is no rupturing stress whatever on the leak-proof ring itself; increase of pressure tends only to compress it. The same ring remains leak-tight also at zero pressure; it will maintain a vacuum of 28 inches of mercury, and will resist inflow of fluids from the outside of the pipe against very considerable exterior pressures. The flexible composition of which the Victaulic leak-proof inner ring is made, is the result of prolonged investigation and experiment carried out with the object of securing the utmost durability, and the material which has been evolved is superior to anything of its kind that has been used previously for jointing although a high degree of permanency was reached even in the early days of rubber composition jointing.

It is interesting in this connection to note that authoritative investigations into the question of the durability of rubber compositions has revealed the fact that material similar to that originally used for Victaulic joints is still giving perfect service on water and gas mains which have been in use in different areas for periods ranging from eighteen to upwards of forty years.

The limit of useful life of the latest Victaulic composition will not, obviously, be known for a very long time to come. Meanwhile, it is worthy of remark that out of the very large number of Victaulic joints which have been fitted in various parts of the world since June, 1919, no complaint of any sort whatsoever referring to durability has ever been made, but, on the other hand, many reports have reached us testifying to the 100 per cent. efficiency of Victaulic joints and the saving of money made, on installation and upkeep costs, by their adoption.

A brief description of the advantages derived from the Victaulic Joint.

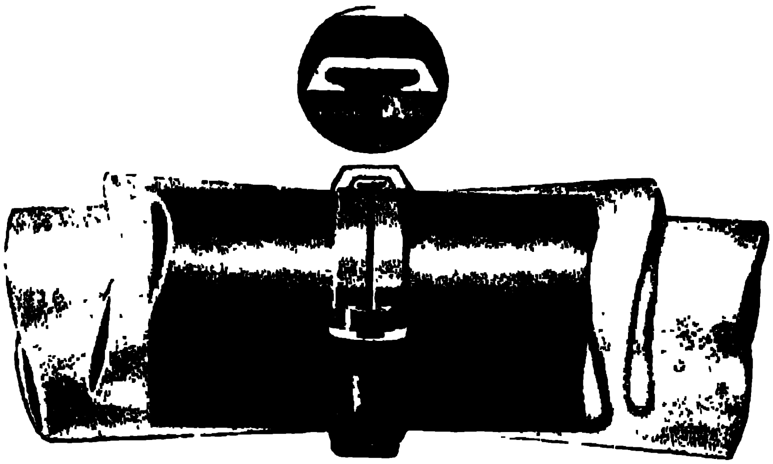
1. Can be fitted in a moment by unskilled labour.
2. Is really leak-proof.
3. Couples the pipes, yet is flexible under pressure.
4. Lowers installation and upkeep costs.
5. Needs no exact aligning of pipes.
6. Is interchangeable on all makes of pipes.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

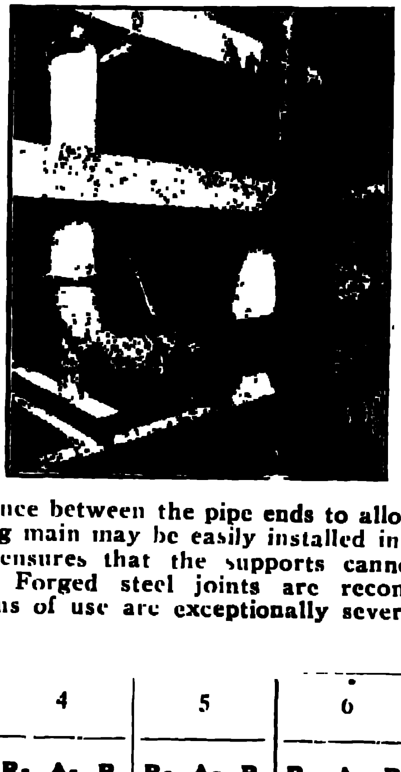
Victaulic Pipe Joints for Water and Compressed Air.



The Victaulic joint will flex under pressure—an invaluable feature where pipes are subject to movement. In shadow in the above illustration are shown the extreme positions permitted by the flexibility of the joint, and in the circle, enlarged to show the sealing lips, is a section through the leak-proof ring.

Main Pipe Lines.

On Hydraulic mains, Compressed air lines, C.-I. water mains, Wrought-Iron and Galvanized pipe lines, Victaulic joints have many outstanding advantages chief of which are lower initial cost as compared to any other type of jointing and great saving in cost of laying and upkeep. This illustration shows how the joints permit pipes to be laid without any special alignment



Rising Mains.

Victaulic joints are ideal for use on rising mains and other lines in the shafts, the chief advantages being the small space occupied due to the compactness of the joint. It is an easy matter to take out any pipe-length without cutting, as there are no spigots in the range

The Expansion Joints, sometimes provided on rising mains, are not necessary if Victaulic joints are used, since there is sufficient clearance between the pipe ends to allow for ordinary expansion With the Victaulic joint, therefore, the rising main may be easily installed in a way which not only does away with any expansion joints, but also ensures that the supports cannot become overloaded owing to expansion or contraction of the pipes. Forged steel joints are recommended for rising mains and for other positions where the conditions of use are exceptionally severe

Particulars and Prices.

Nominal Bore			3	4	5	6
	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.
Lap Welded Mild Steel Pipes in 16/18 ft. lengths with expanded ends for Victaulic joints p. ft.	0 15 0	1 2 0	1 5 0	1 12 6	2 8 6	3 3 0
Do. do. Galvanized „	1 2 9	1 6 6	1 11 0	2 5 6	......	.....
Bends to suit above, Black each	8 8 0	10 14 0	12 4 0	22 14 0	36 8 0	59 12 0
Do. do. Galvanized „	10 6 0	13 8 0	15 4 0	28 12 0	......	.....
Adapters one end screwed to suit Standard piping, Black each	15 4 0	17 4 0	20 5 0	22 10 0	26 0 0	30 0 0
Do. do. Galvanized „	19 0 0	21 8 0	25 6 0	28 4 0	......	.....
Victaulic Joints (semi-steel housings) complete for above each	3 13 0	4 10 0	5 10 0	7 10 0	9 6 0	10 15 0

NOTE.—Victaulic joints are not at present supplied for use on steam pipes.

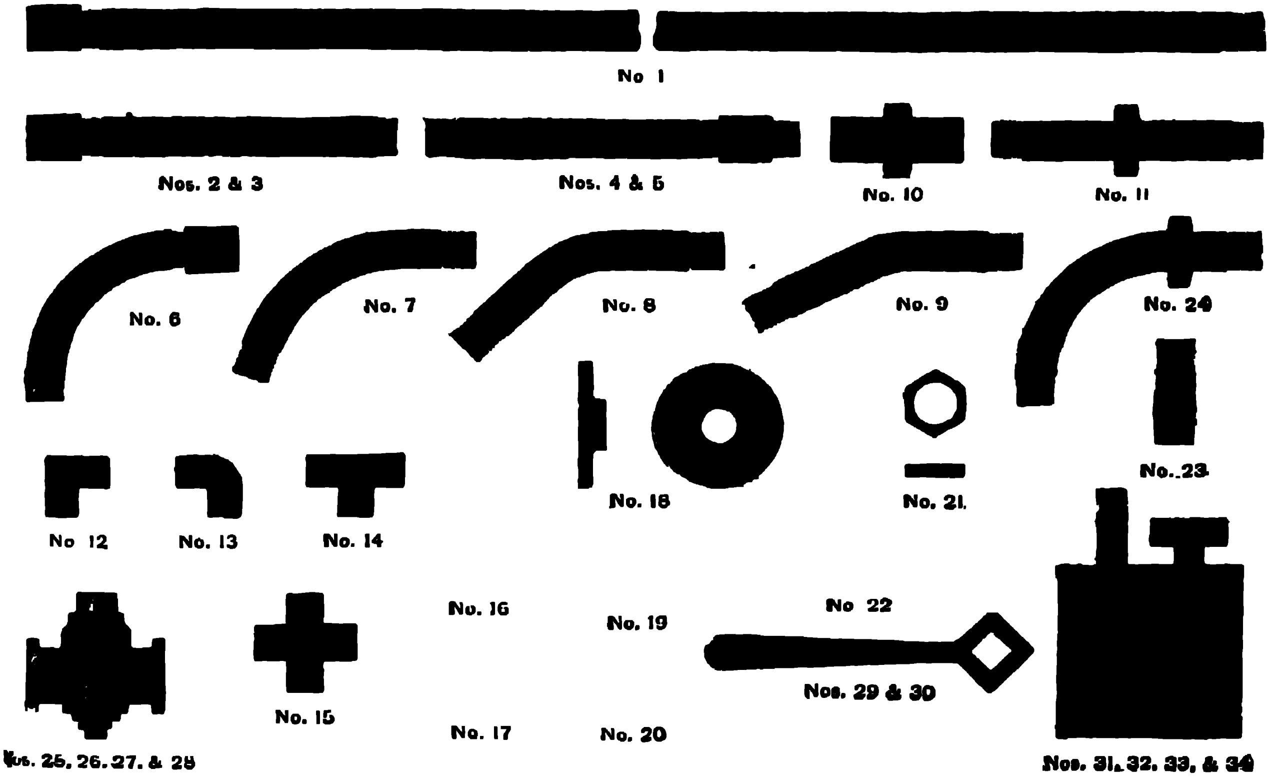
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Wrought-Iron or Mild Steel Tubes and Fittings.

For Gas, Water and Steam.



Wrought-Iron or Mild Steel Pipes, in original lengths of 16|18 feet, and Fittings are stocked in three qualities, *viz.*, Black Gas, Galvanized, and special Steam Quality for High Pressures painted red.

Test Pressures.

Black Gas Tubes tested to 250 lbs. per square inch.
Galvanized Tubes „ „ 375 lbs. „ „ „
Special Steam Tubes „ „ 500 lbs. „ „ „

On page 157 will be found the prices of the Pipes and Fittings illustrated above, and on page 156 the approximate weights, dimensions, etc.

Wrought-Iron or Mild Steel Tubes and Fittings.

For Gas, Water and Steam.

Standard Sizes and Approximate Weights of Gas, Galvanized and Steam Tubes.

Nominal Internal Diameter. Ins.	Actual Outside Diameter. Ins.	Black Gas: Thickness Standard Wire Gauge.	Black Gas: Approx. Weight in lbs. per ft.	Galvanized Gas Quality: Thickness Standard Wire Gauge.	Galvanized Gas Quality: Approx. Weight in lbs. per ft.	Steam Quality: Thickness Standard Wire Gauge.	Steam Quality: Approx. Weight in lbs. per ft.	Continental: Gas. Approx. Weight in lbs. per ft.	Continental: Galvanized. Approx. Weight in lbs. per ft.	Continental: Steam. Approx. Weight in lbs. per ft.
¼	17/32	14	·385	14	·415	12	·472	·41	·43	·49
⅜	11/16	13	·582	13	·628	11	·703	·55	·57	·66
½	27/32	12	·818	12	·883	10	·973	·81	·85	·97
¾	1 1/16	11	1·165	11	1·234	9	1·403	1·19	1·25	1·43
1	1 11/32	10	1·653	10	1·752	8	2·008	1·63	1·71	1·96
1¼	1 11/16	9	2·307	9	2·485	7	2·827	2·27	2·39	2·72
1½	1 29/32	8	2·973	8	3·121	6	3·509	2·79	2·93	3·35
1¾	2 5/32	8	3·406	8	3·576	6	4·019			
	2⅜	8	3·786	8	3·937	6	4·473	3·94	4·13	4·72
	2⅝	7	4·602	7	4·786	5	5·447			
	3	7	5·338	7	5·551	5	6·323	4·94	5·19	5·92
	3½	7	6·309	7	6·561	5	7·483	5 89	6·19	7·06
	4	7	7·265	7	7·555	5	8·627	7·11	7·47	8·53
	4½	7	8·253	7	8·583	5	9·803	8·33	8·75	9·99
	5	7	9·230	7	9·599	5	10·969			
	5½	7	10·232	7	10·611	5	12·159	10·50	11·01	12·60
	6½	7	12·305	5	12·797	5	14·609	12·42	13·04	14·90
	7½	3/16"		5	17·43		19·65			
	8½	3/16"		5	20·09		23·00			

Approximate Weights of Fittings.

Nominal Internal Diameter. Ins.	Weight of 10 Tees. lbs.	Weight of 10 Bends. lbs	Weight of 10 Elbows. lbs.
¼	1½	2	1¼
⅜	2	3½	1¾
½	3	5½	2¾
¾	5½	9½	4¼
1	8	14	7
1¼	13	23	11
1½	18	32	14½
1¾	24	40½	18
2	30	50	23½
2¼	40	73	34
2½	52	96	48
3	75	122	73
3½	104	160	91
4	144	200	123
5	250	420	220
6	350	530	325

Standard Dimensions of Flanges.
(Ordinary, Gas and Steam Quality.)

Nominal Internal Diameter of Tube. Ins.	Outside Diameter of Flanges. Ins.	Thickness of Flange. Gas. In.	Thickness of Flange. Steam. In.	Depth through Screwed Part. Gas. Ins.	Depth through Screwed Part. Steam. Ins.
	2½	⅛	5/32	⅜	
	3	5/32	3/16	7/16	
	3¼	3/16	7/32	½	
¾	4	7/32	9/32		
1	4½	¼	9/32		
1¼	4¾	9/32	5/16	11/16	
1½	5¼	5/16		11/16	
1¾	5½	5/16	11/32	¾	
2	6	5/16	⅜	13/16	
	6¼	11/32	⅜	13/16	
2½	6½	⅜	13/32	⅞	
3	7¼	13/32	7/16	15/16	
3½	8	13/32	7/16	15/16	
4	8½	7/16	15/32	1	
4½	9	15/32	17/32	1 1/16	
5	10	½	9/16	1 3/16	
6	11	9/16	⅝	1¼	

For Special Steam Flanges see page 154.

Sizes ...	1/4"	3/8"	1/2"	3/4"	1"	1 1/4	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	6"	7"	8"
	R. a. p.	R. a. p.	R. a. p	R. a. p.	R. a. p.	R. a. p	R. a. p	R. a. p.	R. a. p.	R. a. p	R. a. p	R. a. p.	R. a. p.	R. a. p.	R. a. p.	R. a. p	R. a. p.	R. a. p.	R. a. p.
PIPES.																			
Gas, Black, British ..	0 2 3	0 2 3	0 3 0	0 3 9	0 5 0	0 7 0	0 9 0	0 11 0	0 12 0	1 0 0	1 3 9	1 5 0	1 10 6	1 13 3	2 4 6	2 8 0	2 15 0	6 0 0	7 8 0
Do. Continental	0 2 0	0 2 0	0 2 9	0 3 3	0 4 3	0 6 0	0 7 9	0 9 6	0 10 5	0 14 0	1 0 0	1 2 3	1 7 6	1 9 9	1 14 6	2 1 6	2 10 0	..	..
Galvanized, British	0 3 0	0 3 3	0 4 0	0 4 9	0 6 6	0 9 0	0 11 6	0 14 0	0 15 6	1 5 0	1 7 0	1 11 0	2 2 0	2 5 0	2 15 0	3 2 0	4 0 0	..	..
Do. Continental	0 2 9	0 3 0	0 3 9	0 4 6	0 6 0	0 8 0	0 11 0	0 13 6	0 14 0	1 4 0	1 6 0	1 9 6	2 0 0	2 3 0	2 12 0	2 15 0	3 12 0	..	..
Special Steam, British ..	0 3 0	0 3 3	0 4 3	0 5 0	0 7 0	0 9 9	0 12 3	0 15 0	1 0 6	1 6 0	1 9 0	1 14 0	2 5 0	2 8 0	3 2 0	3 6 0	4 4 0	7 8 0	8 10 0
Do. Continental	0 2 6	0 2 9	0 3 6	0 4 3	0 5 0	0 8 0	0 10 0	0 12 6	0 13 6	1 2 6	1 4 0	1 8 0	1 14 0	2 1 0	2 10 0	2 13 0	3 9 0	..	..
FITTINGS, ALL BRITISH.																			
Bends, Gas .. –	0 5 3	0 5 9	0 7 0	0 9 0	0 12 6	1 4 3	1 8 3	2 0 0	2 7 9	4 1 0	5 12 0	8 10 0	12 0 0	15 9 0	33 5 0	50 8 0	72 4 0	..	..
Do. Galvanized .. –	0 6 6	0 7 3	0 8 9	0 11 0	0 15 0	1 9 0	1 14 3	2 7 0	3 1 8	..	7 2 0	10 12 0	14 14 0	19 5 0	47 9 0	62 11 0	89 9 0	..	..
Do. Steam	0 6 9	0 7 0	0 9 0	0 11 6	1 0 0	1 9 9	1 15 0	2 8 0	3 2 6	..	7 6 0	11 0 0	15 5 0	19 14 0	48 14 0	64 3 0	92 6 0	100 0 0	115 0 0
Elbows, Gas	0 7 9	0 9 0	0 10 0	0 11 6	0 13 0	1 4 0	1 7 9	1 11 0	2 7 0	..	4 8 0	6 10 9	10 7 6	13 5 0	35 11 0	45 3 0	71 6 0	..	..
Do. Galvanized –	0 8 6	0 9 6	0 11 0	0 12 9	0 15 3	1 0 0	1 10 3	2 2 0	2 11 3	..	5 1 0	7 8 9	11 13 9	17 1 0	40 7 0	51 4 0	80 14 0	..	..
Do. Steam	0 9 6	0 10 3	0 12 0	0 14 6	1 1 0	1 7 9	1 12 9	2 0 0	2 15 0	..	5 10 9	8 10 3	12 15 0	16 3 0	40 7 0	51 4 0	80 14 0	.	..
Tees, Gas	0 9 3	0 10 0	0 11 6	0 14 6	1 0 9	1 7 0	1 12 3	2 0 0	2 14 6	..	5 7 0	[illegible]	12 0 0	15 3 6	37 1 0	46 10 0	73 12 0	..	..
Do. Galvd. and Steam ..	0 10 3	0 11 0	0 12 9	1 0 3	1 2 9	1 9 0	1 15 0	2 10 0	3 3 6	..	6 3 3	9 11 6	14 0 0	17 4 0	42 1 0	52 13 6	83 9 0	132 0 0	160 0 0
Nipples Barrel, Gas ..	0 3 3	0 3 3	0 4 0	0 4 6	0 6 0	0 8 0	0 10 6	0 13 0	0 13 9	..	1 7 0	1 15 6	2 15 3	3 9 0	4 14 0	6 2 3	9 13 0	..	..
Do. do. Steam ..	0 4 3	0 4 3	0 5 0	0 5 9	0 7 6	0 9 9	0 13 0	1 0 3	1 1 0	..	1 13 3	2 7 0	3 10 0	4 4 3	6 1 6	7 10 0	12 4 0	..	..
Backnuts & Nipples, Gas ..	0 1 0	0 1 6	0 2 3	0 2 9	0 4 0	0 4 6	0 6 3	0 7 3	0 10 0	..	1 2 3	1 10 9	2 2 3	2 10 0	6 10 0	8 9 0	12 6 9	..	..
Do. Galvd. & Steam	0 1 9	0 1 9	0 2 6	0 3 0	0 4 3	0 5 3	0 6 9	0 8 6	0 11 0	..	1 3 6	1 14 3	2 7 0	2 15 6	7 9 0	9 11 0	14 1 0	..	..
Sockets, Gas	0 2 3	0 2 3	0 3 0	0 4 0	0 4 6	0 6 0	0 8 0	0 10 0	0 11 6	..	1 3 0	1 10 0	2 6 0	2 13 9	4 12 3	5 11 6	8 9 0	..	..
Do. Galvd. & Steam ..	0 2 6	0 2 6	0 3 0	0 4 3	0 5 0	0 6 0	0 9 0	0 11 0	0 12 9	..	1 5 9	1 14 3	2 11 3	3 3 9	5 6 3	6 7 6	9 11 0	..	..
Do. Reducing Gas ..	0 3 0	0 4 0	0 4 6	0 5 6	0 7 0	0 9 3	0 12 3	1 0 0	1 2 3	..	2 6 0	3 5 3	4 2 6	5 3 9	11 14 3	16 10 6	26 5 0	..	..
Do. Galvd. & Steam –	0 3 0	0 4 3	0 5 0	0 6 0	0 7 3	0 10 3	0 13 6	1 1 9	1 4 6	..	2 11 3	3 12 6	4 13 9	5 15 0	13 7 9	19 14 0	29 10 0	..	..
Plugs, Gas – ..	0 2 3	0 2 3	0 3 0	0 4 0	0 4 0	0 6 0	0 7 9	0 9 3	0 11 6	..	1 8 0	2 4 3	3 5 3	4 12 3	10 7 6	14 4 6	22 14 0	..	..
Do. Galvanized	0 2 6	0 2 6	0 3 6	0 4 3	0 5 0	0 6 9	0 8 6	0 10 3	0 12 9	..	1 5 9	2 9 0	3 12 6	5 6 3	11 13 0	16 3 0	25 14 0	..	..
Crosses, Gas – ..	1 4 0	1 5 6	1 9 3	1 13 9	2 5 0	3 2 3	3 12 3	4 13 9	6 0 0	..	10 7 6	19 0 6	26 10 3	31 11 0	63 3 9	104 10 0	166 8 0	..	..
Do. Galvd. & Steam ..	1 6 0	1 7 9	1 12 0	2 1 0	2 9 6	3 8 0	4 3 0	5 0 3	6 10 9	..	11 13 9	21 9 0	30 3 0	36 15 0	94 5 6	115 9 9	168 11 6	..	..
Socket, Union. Gas ..	1 2 3	1 7 0	1 11 0	2 4 0	3 2 3	3 13 9	4 9 0	5 2 3	5 11 6	..	8 5 8	10 11 3	13 1 3	16 10 0	22 13 6	51 6 3	50 6 0	..	..
Flanges, Gas	0 4 6	0 5 0	0 6 0	0 7 0	0 8 3	0 10 9	0 12 3	0 13 9	1 0 0	..	1 9 6	2 11 3	3 2 9	3 10 6	5 1 3	5 11 6	8 9 0	..	..
Do. Galvanized ..	0 5 6	0 6 0	0 7 3	0 8 6	0 9 6	0 12 6	0 14 3	1 0 0	1 3 6	..	1 14 6	3 3 9	3 13 0	4 6 0	6 1 6	6 14 0	10 4 6	..	..
Do. Steam	0 5 6	0 6 0	0 7 3	0 8 6	0 12 6	0 14 3	1 0 0	1 3 6	2 8 6	..	3 3 9	3 13 0	4 6 0	6 1 6	6 14 0	10 4 6	14 0 0	20 8 0	22 8 0

Red Steam Flanges.—B. S. S. Table No. 2.

		Rs. A. P.			Rs. A. P.			Rs. A. P.			Rs. A. P.			Rs. A. P.
3½"×½"×⅜"	thick	.. 1 1 6	4½"×1"×⅜"	thick	.. 1 5 0	6"×1¼"×½"	thick	.. 2 0 0	7½"×2½"×⅝"	thick	.. 3 3 9	11"×5"×⅞"	thick	.. 10 4 6
4"×⅝"×⅜"	,,	.. 1 3 3	5½"×1½"×½"	..	. 1 11 6	6½"×2"×½"	..	.. 2 9 9	9"×3"×⅝"	,	.. 4 6 0	13½"×7"×⅞"	..	.. 20 8 0

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** **RANGOON, MADRAS, BOMBAY, LONDON.**

Lap-Welded and Solid Drawn Steel Boiler Tubes.

Thickness according to the British Imperial Standard Wire Gauge.

External Diameter ..	Ins	1¼	1½	1¾	2	2¼	2½	2¾	3	4	5
Thickness	S. W. G.	13	13	13	12	12	11	11	11	9	8
	Ins.	·092	·092	·092	·104	·104	·116	·116	·116	·144	·160
Lap-Welded, **Price**, per foot	**Rs.**	**0-13-0**	**0-13-0**	**0-13-6**	**0-15-0**	**1-0-6**	**1-1-0**	**1-3-3**	**1-6-9**	**2-6-0**	**3-9-6**
Solid Drawn, **Price**, per foot	**Rs.**	**1-1-0**	**1-1-0**	**1-2-0**	**1-4-0**	**1-6-0**	**1-8-0**	**1-10-0**	**1-15-0**	**3-3-0**	**4-12-0**

The above prices are for stock lengths of 15 to 17 feet.

Prices for larger tubes, and up to ½ inch in thickness on application.

All Boiler Tubes are tested by Hydraulic Pressure to 1,000 lbs. per square inch.

Boiler Tubes are usually swelled 1/16 inch or ⅛ inch at one end, and the amount of swelling or cressing required should be clearly stated when ordering.

Charge for Swelling or Cressing Re. 1-0 per inch diameter.

Boiler Tube Ferrules. Taper 1/16 inch made to order in all sizes.

Lap-Welded and Solid Drawn Steel Hydraulic Tubes.

Hydraulic Tubes are supplied plain at ends, and in usual stock lengths of 16 to 18 feet, unless ordered to the contrary.

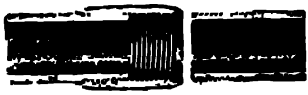
Internal Diameter ..	.. Ins.	½	⅝	⅝	¾	1	1⅛	1¼	1½	1½	1½	2	2	2¼	2½
External Diameter ..	.. Ins.	1	1	1⅛	1¼	1⅝	1½	2	2	2¼	2⅜	2½	3	2¾	3
Lap-Welded, **Price**, per foot	.. **Rs.**	**1-0**	**0-12**	**1-3**	**1-5**	**2-0**	**1-8**	**3-0**	**2-0**	**3-12**	**4-8**	**3-2**	**6-0**	**5-8**	**7-2**
Solid Drawn, **Price**, per foot	.. **Rs.**	**1-3**	**0-14**	**1-6**	**1-9**	**2-5**	**1-12**	**3-8**	**2-5**	**4-2**	**5-4**	**3-10**	**7-0**	**6-0**	**8-8**

Hydraulic Tubes are manufactured in many sizes not detailed above but we shall be pleased to quote for same on application.

Lap-Welded Boring and Casing Tubes.

No. 1.

No. 2.



No. 3.

No. 4.

No. 1.—Swelled and Cressed Joint, for Tubes of thin gauge. The Tube is expanded and contracted to preserve the maximum strength of metal at the joint. The recognised standard thicknesses for Tubes with this form of joint are the thinnest given on the list but the joint can be made on Tubes of any heavier thickness that may be desired. For lining bore-holes or well casing this is the joint most commonly used.

External Diameter .. Ins	3		4		4½	5		6	7	8		9	10½	12	
Internal Diameter .. Ins.		3		4			5				8				15
Price, per foot, 11 Wire Gauge thick, **Rs.**	2-0	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„ „ „ 10 „ „ „ „	2-2	..	.	.	..	..	..	..	..	..	..	..	..	..	..
„ „ „ 9 „ „ „ „	2-4	..	2-12	..	3-2	..	.	..	..	..	..	..	..	..	..
„ „ „ 8 „ „ „ „	2-6	..	2-15	..	3-8	4-0	..	..	..	..	..	.	..	..	
„ „ „ 7 „ „ „ „	2-8	2-8	3-2	..	3-10	4-4	..	5-4	6-10	.	..	..	..	..	..
„ „ „ 6 „ „ „ „	.	..	3-4	3-4	4-0	4-8	4-8	5-8	7-0	..	..	..	..	..	..
„ „ „ 5 „ „ „ „	..	..	..	..	..	4-14	..	6-0	7-12	8-12	.	..	..	..	..
„ „ „ 3 „ „ „ „	..	..	..	..	..	..	..	7-0	9-0	9-14	..	10-0	12-0	..	..
„ „ „ ¼ inch „ „ „	..	..	..	..	..	..	..	..	..	9-14	9-14	10-0	12-0	..	..
„ „ „ 5/16 „ „ „ „	..	..	..	..	..	..	.	..	..	..	..	11-12	14-0	17-0	..
„ „ „ ⅜ „ „ „ „	..	..	..	..	.	..	..	..	.	..	..	..	17-0	20-0	26-8

Usual Stock Lengths underlined.

The external diameter at the joints is 1/16 inch to ⅛ inch more than the rest of the Tubes

No. 2.—Flush Joint, or Butt-and-Butt, the superfluous metal being turned off before the threads are cut, so that the Tubes when screwed together are absolutely flush both outside and inside. This joint, from its nature, can only be made on Tubes of heavy section; in any case not less than ¼ inch, and the following particulars indicate the best current practice.

Sizes, 2 inches to 4 inches outside .. ¼ inch, Sizes, 8¼ inches to 10 inches outside .. ⅜ inch
„ 4½ „ „ 8 „ „ . 5/16 „ „ 10¼ „ „ 12 „ „ .. 7/16 „

These thicknesses may be taken as the thinnest that can be used with advantage. This class of Tubing is generally used in experimental boring for water, as the joint offers no obstacle to the easy withdrawal of the Tubes from the bore-hole.

External Diameter	Ins.	3	4	4½	5	6		8	9	10	12
Thickness	Ins.	¼	¼	5/16	5/16	5/16	5/16	5/16	⅜	⅜	
Price, per foot	**Rs.**	4-0	5-4	5-12	6-6	7-12	9-0	12-4	15-12	17-4	24-12

No. 3.—Heavy Drive Tube Joint, used for boring for petroleum and brine wells, etc. The Tubes are screwed and fitted with extra strong bevelled or barrel-shaped sockets, recessed at ends to facilitate jointing, and screwed so that the ends of the Tubes butt face to face in the centre of the socket; the whole strain in driving thus falls on the Tubes. **Prices on application.**

No. 4.—Joint for Well Casing or Lining Tubes, as a substitute for Tubes with joints, as per illustration No. 1. The standard thicknesses are same as for No. 1 joint. The sockets are screwed with tapered threads and recessed at ends to facilitate jointing. **Prices on application.**

Prices for Tubes of other sizes and thicknesses on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Newton" Automatic Sprinkler and Fire Alarm.

As Sole Agents for The "Newton" Automatic Sprinkler and Fire Alarm we are in a position to offer Mill owners and others the modern and most efficient method of Automatic Fire Protection. We have supplied a number of installations in various parts of India, including those at some of the Jute Mills.

When a fire occurs in a building protected with Sprinklers it is arrested and extinguished before material damage is done and without the necessity of human assistance. An alarm is automatically sounded as soon as a Sprinkler comes into operation.

The principle of a Sprinkler Installation is to provide a small yet sufficient supply of water in a system of pipes under all ceilings and roofs of a building, the water being held back until a fire causes its discharge, through one or more Sprinkler Heads, over and around the fire, but nowhere else.

A Sprinkler Installation consists of a system of pipes (slung to the ceilings or roofs) on which the Sprinkler Heads are fitted at intervals of 8 to 12 feet apart. These pipes are connected with larger ones, and the whole system focusses in one rising main pipe, on which is fitted the main stop valve, automatic alarm valve, and in certain cases the "dry pipe" valve. The whole pipe system tapers from the rising main to the Sprinkler range pipes, and is so designed that a volume of water flows from any number of Sprinklers if called into action at the same time. The range pipes are spaced with a view to the efficient protection of the floor under each ceiling or roof bay. When the temperature in a room rises to 155 degrees Fahr. the Sprinklers are automatically brought into action, immediately distributing water over the actual seat of the outbreak. Each Sprinkler is capable of distributing a shower of water over an area of 100 square feet.

A Sprinkler Installation should have two independent Water Supplies one of which must be unlimited whilst the other may be limited.

The following are the accepted services:—

Unlimited.	Limited.
1. Town's Main.	5. Elevated Tank.
2. Pump.	6. Pressure Tank.
3. Hydraulic Injector.	
4. Elevated Private Reservoir.	

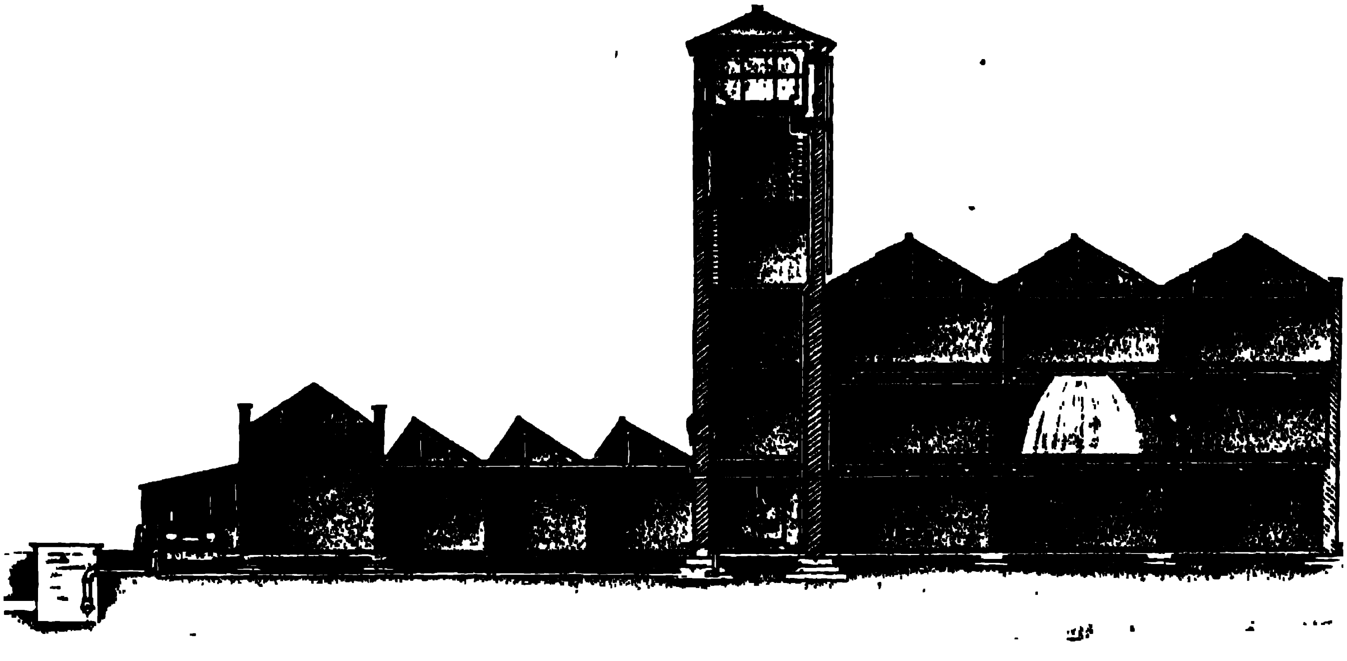


DIAGRAM of a building protected by a "Newton" Automatic Sprinkler Installation having (1) an Elevated Tank and (2) an Automatic Steam Fire Pump, drawing water from reservoir, as the two water supplies.

An Installation equipped with a Town's Main Supply and Elevated Tank is absolutely automatic in its action, and therefore possesses a degree of efficiency which makes it advisable to select this combination whenever it is possible.

The Rules require every Sprinkler Installation to be provided with an automatic alarm, which will give immediate notice of the opening of a Sprinkler Head. Every "Newton" Installation is equipped with a complete automatic alarm apparatus.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

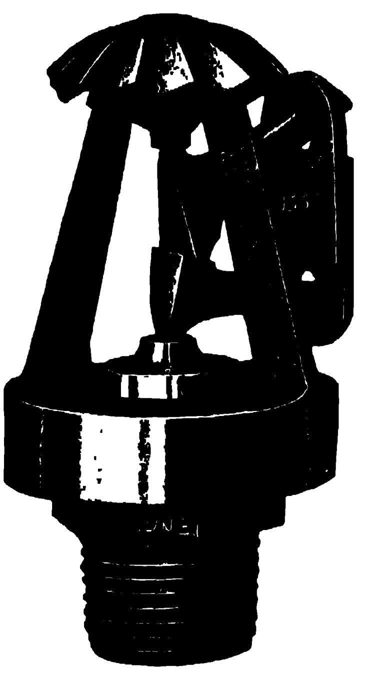
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Newton" Automatic Sprinkler and Fire Alarm.

Above the main stop valve, which is strapped and sealed or padlocked open, is fitted an alarm valve, which is automatically lifted by the flow of water as soon as the pressure in the installation is reduced by the opening of one or more Sprinkler Heads, causing an escape of water. The lifting of the alarm valve admits water into a pipe connected to a small turbine motor, the revolution of which causes an alarm to be sounded on a steel gong fixed on the outside wall of the building. By the above means a "Newton" Sprinkler Installation not only attacks a fire almost as soon as it breaks out, but automatically gives the alarm that it has been called into action.

The supply pipes from the tank and town's main (or pump), are each fitted with a back pressure valve. On the combined supply pipe is fixed the Installation Main Stop Valve and above this the Automatic Alarm. A two-inch drain valve is fitted above the alarm valve to allow for draining the system when it is required to replace Sprinkler Heads, or when a test of the running pressure is required by the Insurance Inspector.



The illustrations show, Fig. 1, a full size Sprinkler Head; Fig 2, a sectional view.

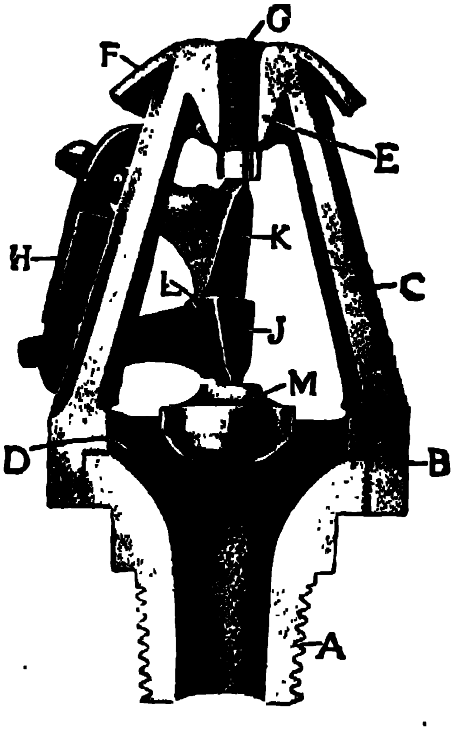
The Sprinkler is fixed by the screwed shank A On the shank end is screwed a ring B carrying the yoke C. A diaphragm D is fitted between the ring and the shank piece, with which it makes a tight joint.

The two arms of the yoke meet at a conical boss E to which is riveted a water distributor F. Through the boss runs a screw G, used to adjust the Sprinkler when fitted at the works. This screw is afterwards pinned to the boss, so that it cannot be tampered with.

The fusible joint H, in the form of a link, is held in position by two cantilevers J and K, engaging at the fulcrum L, which is on one side of the centre line. Saddle-shaped notches on the levers hold the link securely in position.

The diaphragm D has a circular half-inch opening in the centre.

The valve M is constructed of bronze, silver-plated to prevent electrolytic action and a special disc seating is provided on the diaphragm to make a perfect water joint.



When brought into action the fusible solder melts at 155 degrees Fahr. and the link separates, the two cantilevers fall away, releasing the valve, causing a perfect distribution of water over and around the fire by means of the deflector F.

On the conical boss E are cast two tripping bars, which prevent the valve, on being released, lodging in the distributor and interfering with the spread of water.

The Sprinkler is constructed generally of phosphor-bronze, which ensures it a long life.

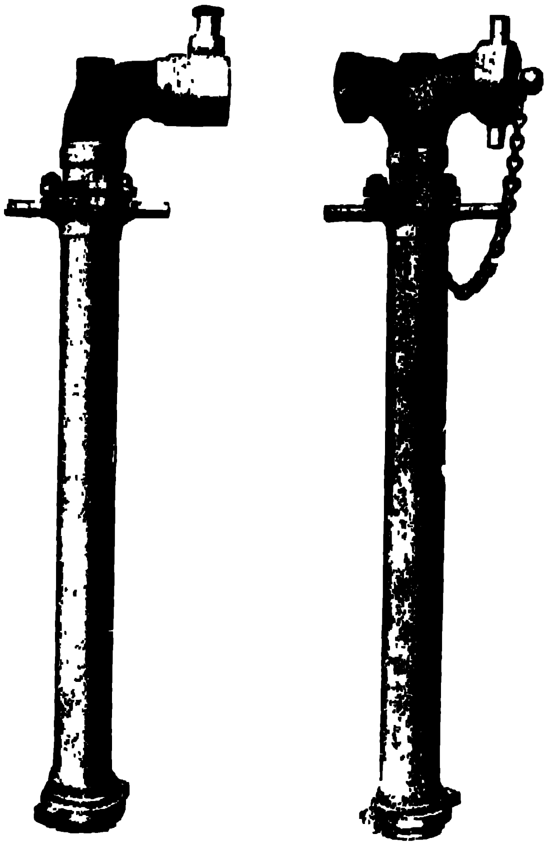
The water distributor is of propeller type, and gives with both high and low pressure an even spread of water. At a pressure of 10 lbs. per sq. inch, about 17½ gallons of water per minute are discharged through on Sprinkler Head and 30 gallons at a pressure of 30 lbs. per sq. inch.

The "Newton" Sprinkler Installations are fully recognised by all Fire Insurance Companies, the premiums being subject to a rebate of 30 per cent. to upwards of 60 per cent. according to the nature of the risk.

We shall be pleased to submit full particulars and estimates, for any type of building, on application.

Standpipes for Hydrants.

Polished Copper Tubes with Gun-Metal Mountings.



Standpipe with Fixed Head, Double Outlets with one cap and chain, fitted with Morris' Instantaneous connections; for Hydrants with Old London V Thread

Size of Outlet 2½ ins. **Price, Rs. 115-0** each.

Standpipe, similar to above, with Single Outlet.

Size of Outlet 2½ ins. **Price, Rs. 80-0** each.

Standpipe with Fixed Head, Double Outlets, with one cap and chain, fitted with Screwed Connections; for Hydrants with V Thread

Size of Outlet 2½ ins. **Price, Rs. 95-0** each

Standpipe, similar to above, with single outlet

Size of Outlet 2½ ins **Price, Rs. 70-0** each

Standpipe with Swivel Head, Double Outlets, with one cap and chain, fitted with Instantaneous Connections; for Hydrants with V Thread.

Size of Outlet 2½ ins **Price, Rs. 135-0** each.

Standpipe, similar to above, with Single Outlet.

Size of Outlet 2½ ins **Price, Rs. 105-0** each.

Standpipe with Swivel Head, Double Outlets, with one cap and chain, fitted with Screwed Connections; for Hydrants with V Thread.

Size of Outlet 2½ ins **Price, Rs. 120-0** each.

Standpipe, similar to above, with Single Outlet.

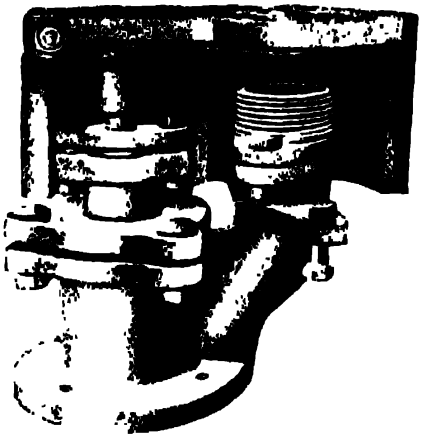
Size of Outlet 2½ ins **Price, Rs. 95-0** each.

Branchpipes and Nozzles.

All Branchpipes have Gun-Metal Mountings and Taper Copper Pipes.

Size.	1	1¼	1½	2	2¼	2½	
Branchpipe with male Instantaneous couplings. **Price, Rs.**	25	25	28	30	40	45	50
Branchpipe with female connection, screwed V Thread. **Price, Rs.**	25	25	28	30	40	45	50

Screwdown Fire Hydrants.



Loose Valve Screwdown Hydrant, having Forged Bronze Spindle and Gun-Metal Nut. Gun-Metal Seat and Stopper.

Complete, 2½ ins. diameter outlet, Screwed Old London V Thread, with chained Cast-Iron Loose Cap to protect Outlet.

Price, Rs. 42-0 each.

Complete, as above, but with chained Hydrant Box.

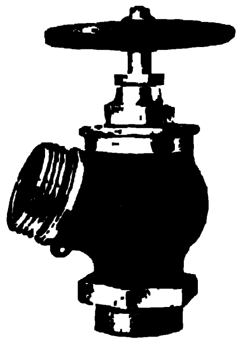
Price, Rs. 55-0 each.

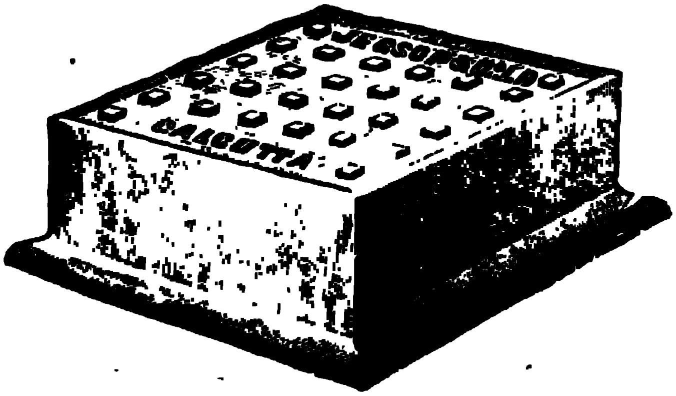
Gun-Metal Fire Valves.

For use inside buildings.

All standard valves are fitted with Iron handwheel.

Description and Size.	Ins.	1½		2½
Valves with flanged inlet, and with oblique, slanting or horizontal outlet, instantaneous connection.	**Price, Rs.**	**38-0**	**50-0**	**60-0**
Valves, as above, but with outlet Screwed V Thread.				
Standard diam. of flange on inlet.	Ins.	5	6	
	Price, Rs.	**32-0**	**40-8**	**49-0**
Valves with screwed inlet, and with oblique, slanting, or horizontal outlet, instantaneous connection.	**Price, Rs.**	**38-0**	**50-0**	**60-0**
Valves, as above, but with outlet Screwed V Thread.	**Price, Rs.**	**32-0**	**40-8**	**49-0**





Road, Surface Boxes or Manholes.

We make Road, Surface Boxes or Manholes in all sizes suitable for Cocks, Hydrants, Sluice Valves, etc., of any diameter.

Price, Rs. 16-0 per cwt.

Seamless Woven Canvas Hose.

For all Purposes and Pressures.

Fire Brigade Super Quality, Tanned or Burnettized, can be supplied complete with Instantaneous Couplings (Fire Brigade Standard) and leather bound ends, in lengths of 100 feet as follows:—

2½" × 18" ply, **Rs. 200-0.** 2¾" × 18" ply, **Rs. 220-0.**

Per length of 100 ft. complete with Couplings

All Fire Brigade Quality Hose is guaranteed to stand a minimum of 500 lbs. pressure, to be manufactured solely from Super Long Line Flax and to be fully up to Fire Brigade and Insurance Specifications. This Hose can also be supplied in 24 ply and 30 ply if required.

Fire Brigade Quality.

Internal Diameter. Ins.	2	2¼	2½	2¾	3
Price, per foot Rs.	1 10	1 12	1 14	2 0	2 4

Jessop's Extra Stout Quality, for water delivery and ordinary main pressures, 12 ply.

Internal Diameter. Ins.	¾	1	1¼	1½	2	2¼	2½	2¾	3	3½	4
Price, per foot Rs.	0 6	0 7	0 8	0 9	0 12	0 14	1 0	1 2	1 4	1 6	1 9

Prices for sizes up to 12 inches on application.

Measurement of Hose when Flat and Approximate Weight.

Internal Diameter. Ins.	¾	1	1¼	1½	2	2¼	2½	2¾	3	3½	4
Flat Measurement. Ins.	1⅜	1⅝	2	2⅜	3¼	3¾	4 1/16	4⅝	5	5⅝	6¼
Approx. Weight per coil of 100 yards. Lbs.	16	22	27	33	44	49	54	60	66	76	88

India-Rubber Delivery Hose.

Suitable for conveying cold liquids for engineering and gricultural purposes

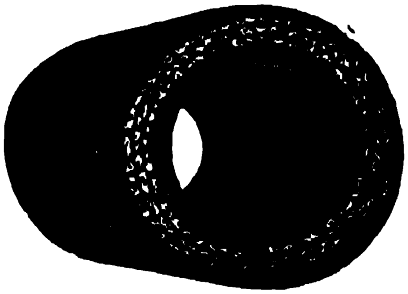
3-Ply suitable for 75 lbs.; 4-ply for 175 lbs. water pressure per square inch, for Hose 1 inch diameter.

Internal Diameter.	Ins		¾			1½				3½	
3-ply Price, per foot	Rs	0 7 6	0 10 0	0 13 0	0 15 6	1 2 0	1 8 0	1 12 0	2 2 0	2 8 0	3 0 0
4-ply, Price, per foot	„	0 8 6	0 11 6	0 15 0	1 1 6	1 7 9	1 11 6	2 0 0	2 6 0	3 0 0	3 4 0

India-Rubber Steam Delivery Hose.

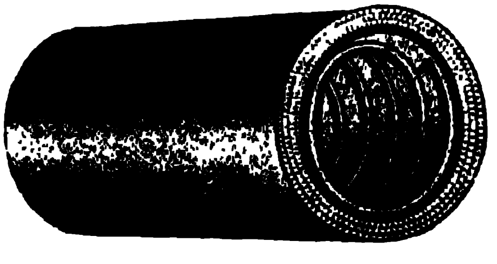
This Steam Delivery Hose is specially prepared to withstand the action of Heat, steam pressure and rough usage. In cases where much pressure is required an outside covering or armouring is recommended.

3-Ply suitable for 60 lbs.; 4-ply for 75 to 80 lbs. per square inch, for Hose 1 inch diameter.



Internal Diameter.	Ins.		¾	1	1¼	1½	2	2½	
3-ply, Price, per foot	Rs	0 12 0	0 15 0	1 4 0	1 8 0	1 12 0	2 4 0	2 12 0	3 8 0
4 ply, Price, per foot		0 14 0	1 1 0	1 6 6	1 10 6	2 0 0	2 8 0	3 6 0	4 0 0

India-Rubber Suction Hose.

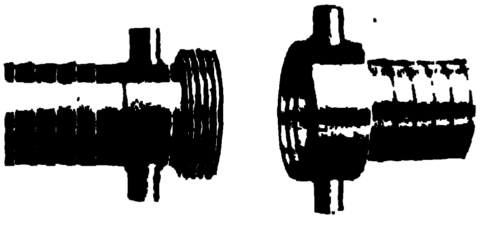


Internally armoured with Spiral Wire of round section.

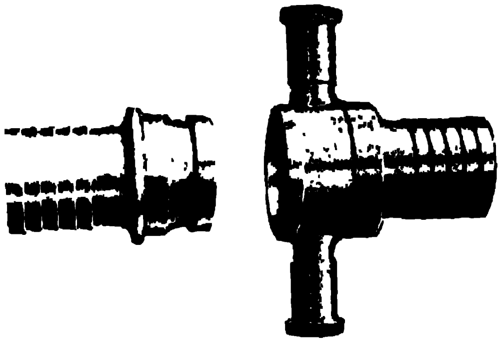
Suitable for Traction Engines, Manual and Steam Fire Engines, Centrifugal Pumps, etc., etc.

Internal Diameter.	Ins.	1	1¼	1½	2	2¼	2½	3	3½	4
Price, per foot	Rs.	1 2 0	1 4 0	1 8 0	2 0 0	2 4 0	2 9 0	3 2 0	3 12 0	4 12 0

Gun-Metal Hose Couplings.



Screwed Coupling



Instantaneous Coupling.

The Instantaneous Hose Couplings are closed by merely forcing the ends together, and opened by pulling out the lugs.

Size.	Ins.	½	¾	1	1¼	1½	2	2¼	2½	2¾	3	3½	4
Screwed Coupling **Price, per pair**	**Rs.**	**2-0**	**2-8**	**3-8**	**5-0**	**7-8**	**16-0**	**18-0**	**20-0**	**25-0**	**28-0**	**30-0**	..
Instantaneous Coupling **Price, per pair**	,,	..	.		..	..	**22-0**	**24-0**	**26-0**	**30-0**	**35-0**	..	..

"Aeroflex" Pneumatic Hose.

This is an ideal hose for users of Compressed Air Plants. It is made of a first class quality of tough India-Rubber Tubing with an internal lining of oil resisting rubber mixture, and is protected throughout its length by Electro-Galvanized "Aeroflex" Steel Armour. It will not kink, will stand the roughest handling, and does not collapse or crush easily. The armouring makes it well adapted for use in exposed or damp places and it cannot become burnt by red hot rivets, or injured by sharp edged tools.

"Aeroflex" Hoses are also suitable for conveying cold or tepid (not boiling) water or other liquids, except oils, corrosive acids and petrol.

Bore.	Ins.	½	⅝	¾	1	1¼	1½	2
Minimum Bending Radius	ins.	3	3½	5	6½	8	10	12
Test Pressure	lbs.	800	700	500	450	450	300	300
Price, per foot	**Rs.**	**2-0**	**2-8**	**3-0**	**4-0**	**5-0**	**6-8**	**7-8**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Patent Flexible Metallic Corrugated Tubing.

This is a reliable and practically indestructible substitute for Rubber Hose capable of carrying steam at all pressures, even in special cases up to 300 lbs. per square inch It is extensively used for a variety of purposes in Railways, Dockyards, Marine Salvage and Ships. It can also be used with advantage for Oil, Gas, Compressed Air and Hydraulic purposes, and it is admirably adapted for Junction Pipes and for Engineering Works of every description.

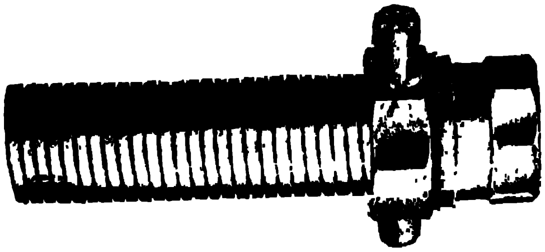
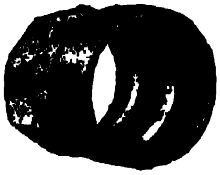
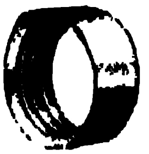
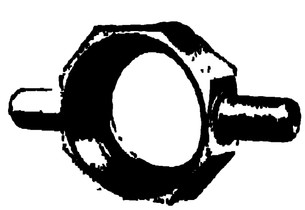
As this Tubing is positively unaffected by heat or cold, and remains flexible at all temperatures it will stand exposure to any kind of weather and to every variety of climate. It is not liable to the attacks of vermin or insects, and it will not char. Moreover, it does not kink or crush, and thus it always delivers to its full capacity and will assure a relatively larger service than rubber, linen, or leather hose of equal sectional area.

Most of the great Railway Companies are users of Flexible Metallic Tubing for a multiplicity of purposes; among others, for Water-feed Pipes from engine to tender, for carriage heating, conveying steam from stationary boilers, driving portable drills, for supply of compressed oil gas to carriages, etc.

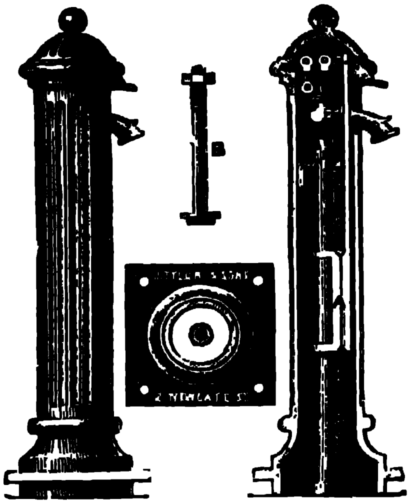
For the conveyance of petroleum and other oils, or greasy liquids, which speedily attack rubber, this tubing gives the best possible results, as the flexibility is improved by the lubricating action of the liquids passing through it.

Internal Diameter.	Ins.	½	¾	1	1¼	1½	2	2½	3	4	5	6	8
Steel No. 2. Price, per foot	Rs.	1-2	1-8	1-12	2-8	3-0	4-0	5-8	6-8	8-0	10-0	12-0	16-
For Hydraulic Pressures up to		500 lbs.				300 lbs.		250 lbs.		200 lbs.		80 lbs.	
„ Steam „ „ „		200 „				150 „		120 „		100 „		40 „	

Gun-Metal Couplings for Flexible Metallic Corrugated Tubing.

Size	Ins.	½	¾	1	1¼	1½	2	2½	3	3½	4
Price, each.	Rs.	3-0	4-12	6-4	9-12	12-14	14-12	19-8	29-8	35-8	42-0



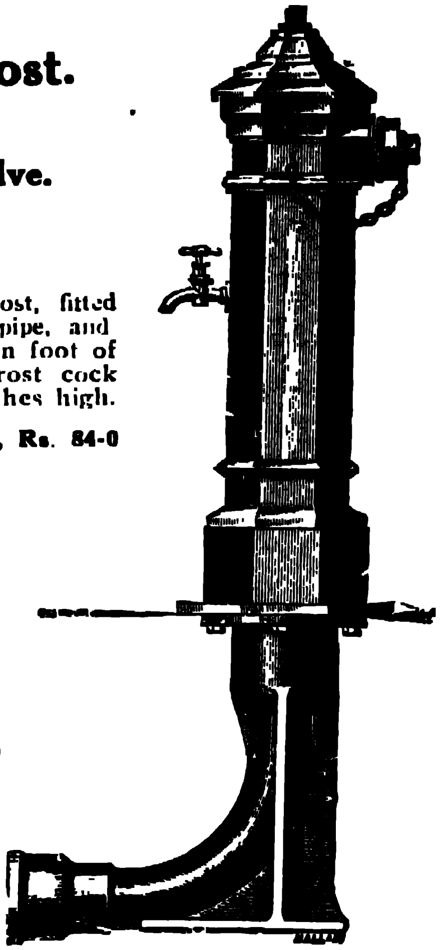
Street Water Post.

With Self-closing Valve.

Fig. 195.

Ornamental Cast-Iron Water Post, fitted with ¾-inch Wrought-Iron supply pipe, and ¾-inch "Waste-not" valve, fixed in foot of post below ground level, with frost cock and lever and weight, 3 feet 2 inches high.

Price, Rs. 84-0



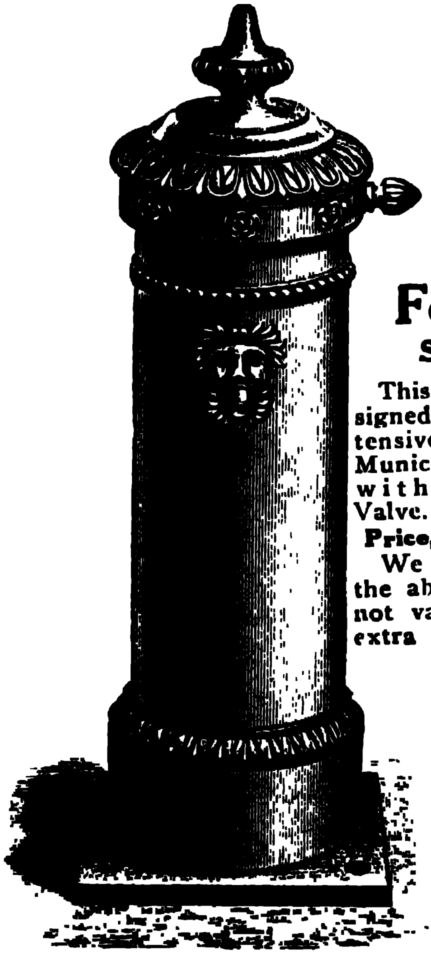
Strong Street Water Post.

Fig. 194.

With cap and chain, outlet screwed to Fire Brigade gauge, fitted with internal 2½ inches pipe and bend The height of Post from ground level is 4 feet, diameter 9 inches.

Price, Rs. 160-0

Swan-Neck, extra „ „ **33-0**



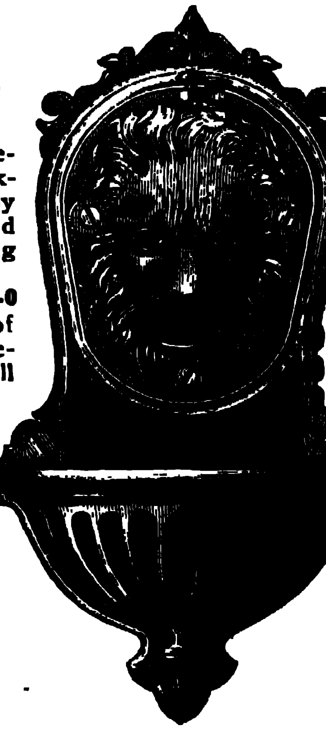
Pillar Fountain.

Self-Closing.

This is specially designed for and extensively used by Municipalities. Fitted with Self-Closing Valve.

Price, each Rs. 144-0

We can fit any of the above with waste-not valves at a small extra charge.



Lion's Head Wall Fountain.

Lion's Head Self-closing Wall Fountain, fitted with Patent Self-closing Non-concussive Tap. Outside dimensions, 1 foot 10 inches by 11 inches by 7 inches deep.

Price, each Rs. 50-0

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steam Jet Air Compressors and Ejectors.

This apparatus is constructed to give a pressure of 10 feet or a vacuum of 24 feet of water, with a steam pressure of 45 lbs.; but, if specially ordered, a pressure of 15 feet or a vacuum of 28 feet of water can be obtained

Compared with Air Pumps this apparatus has the following advantages which gives it preference wherever applicable, *viz.*:—

No moving parts. No repairs necessary.

Cost only a fifth that of Air Pumps.

May be simply inserted in the course of the pipe, while Air Pumps as a rule require foundations, and often separate buildings.

Low price, simplicity, reliability and durability are qualities which have made this Jet Apparatus almost indispensable, even in places where an Air Pump would never have been thought of.

They have been used with great success in Indigo Factories when worked in conjunction with Prof. C. Rawson's Process, in the manufacture of Indigo. By the use of this Compressor or Blower, the following advantages may be noted:—

Increased production over the wheel beating process.

Improved quality and colour of Indigo.

Rapidity of oxidation, thus effecting a saving in fuel and time.

Indigo produced by this process is easier pressed, and gives a larger proportion of unbroken cakes per table.

In addition to the above, this apparatus can be used for other purposes, such as priming centrifugal pumps, lifting tar and acids, etc., as agitators for liquids, by forcing air into them.

Particulars and Prices.

No. of Apparatus.	Cubic feet delivered per hour.	Bore of Steam Pipe.		Bore of Air Pipe.		Price, C.-I. Bodies and G.-M. Nozzles.
		Air Comp.	Ejector.	Air Comp.	Ejector.	
		ins.	ins.	ins.	ins.	Rs.
1	1,400	¾	¾	1¼	1¼	200
2	2,500	1	1	2	2	280
3	5,000	1¼	1½	3½	3	360
4	10,000	1½	2	4	3½	480
5	15,000	2	2½	5	3½	600
6	20,000	2¼	2¾	5½	3½	720
7	25,000	2½	3	5½	4	840
8	30,000	2¾	3½	6	4½	960
9	36,000	3	3½	6½	5	1,080
10	42,000	3	4	7	5	1,200

Prices of Apparatus made of Lead, Antimony, etc., on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

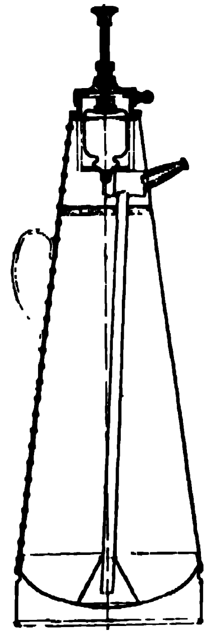
RANGOON, MADRAS,
BOMBAY, LONDON.

Chemical Fire Extinguishers Simplex.

By Mather and Platt Ld., Manchester.

Guaranteed to fulfil Fire Insurance requirements.

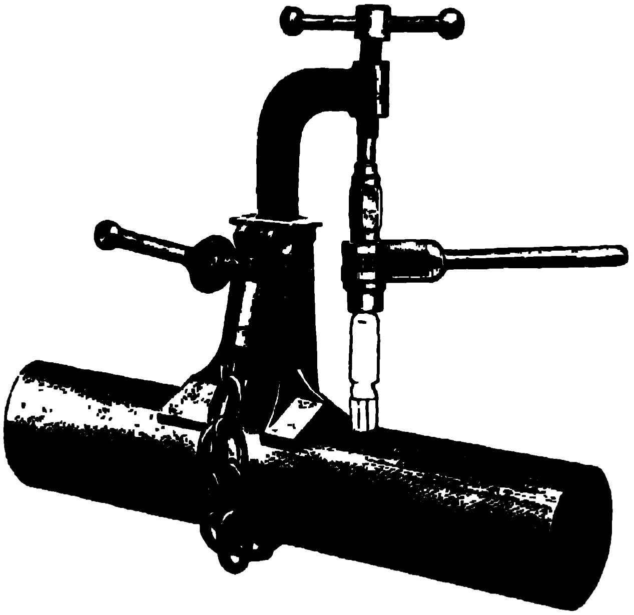
Set to work instantaneously by the merest novice these **fire-fighters** have been frequently found effective in preventing apparent insignificant outbreaks from becoming what would have proved large and dangerous conflagrations.



Size No. 2. Two gallon capacity with stout steel bodies lead coated on both sides, tested to 350 lb. pressure, with gun-metal fittings and artistically enamelled.

Price with one charge complete .. .. **Rs. 40-0**

Although the "Simplex" Extinguisher may stand unused for years it will instantly come into operation on the knob being struck and throw its contents a distance of 40 feet.



Drilling and Tapping Apparatus

For Gas and Water Mains.

Malleable Iron Drill Stand for mains from 2 to 24 ins. dia. Complete Drill Stand with Ratchet Brace Chains and Spanner .. .. **Rs. 140-0**

Drills and Reamers extra as required.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

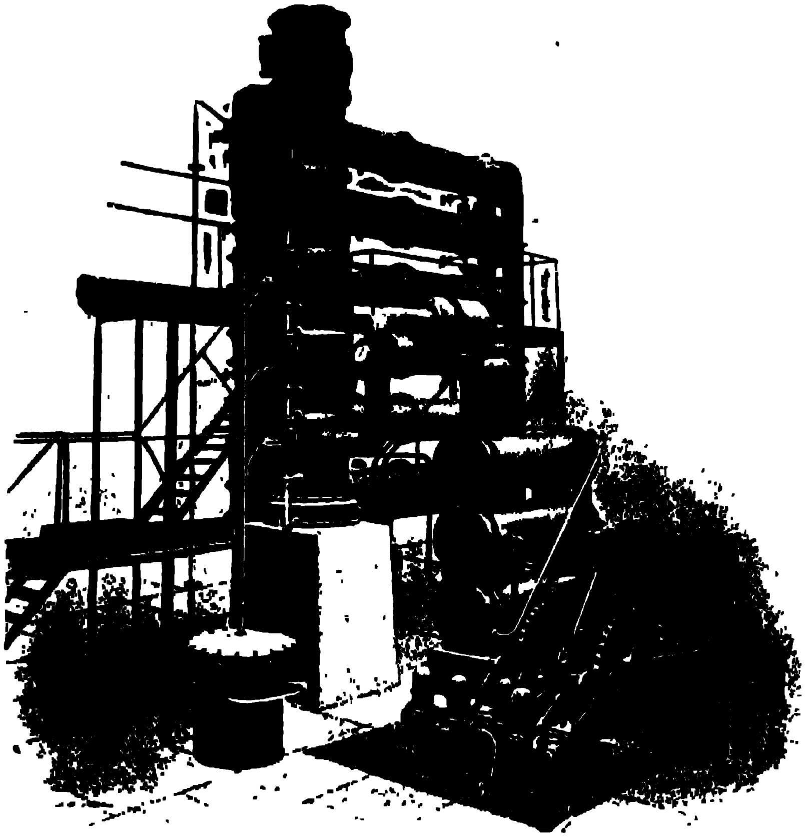
JESSOP & CO. LTD.
ENGINEERS.

RANGOON, MADRAS,
BOMBAY, LONDON.

Distilling Plant.

For Land Installation.

In places where water is scarce or of a quality which cannot be used for drinking or commercial purposes, an economical system of water distillation can often supply at a moderate cost water of a quality equal to the best natural supply.



The above illustration shows a modern "Sextuple Effect" Distilling Plant consisting of Vacuum and Auxiliary Pumps, Surface Condensers, Preliminary Heaters and Lime Catchers, having a capacity approximately of 50 tons of pure water per 24 hours. Plant can be supplied with any number of "Effects" from one to six, the number selected depending on the size of the plant and capital outlay which can be considered. The greater the number of effects the higher the resulting economy. Thus with "Single Effect" for every 100 lbs. of primary steam raised in the boiler, an additional 75 lbs. of pure drinking water will be obtained; with "Double Effect" the additional amount will be 150 lbs. of pure water, while with "Sextuple Effect" 450 lbs. of gained pure distilled water can be guaranteed, or 36 tons of pure water per ton of ordinary quality coal We shall be pleased to quote for suitable plant on receipt of particulars of the quantity of water required per day, maximum quantity per hour. and purpose for which it is required. Water required for drinking purposes is finally passed through a special filter where it is aerated and thereby relieved of its insipid state and rendered palatable.

Small Distilling Plants.

We can also offer small Distilling Plant to produce from 1 gallon an hour of pure distilled water upwards. Such plant are particularly suitable in small factories, central electric stations for accumulated make up, etc. They are inexpensive in first cost and pure water can be obtained from them at less than a tenth of the price at which it can be bought in carboys or bottles.

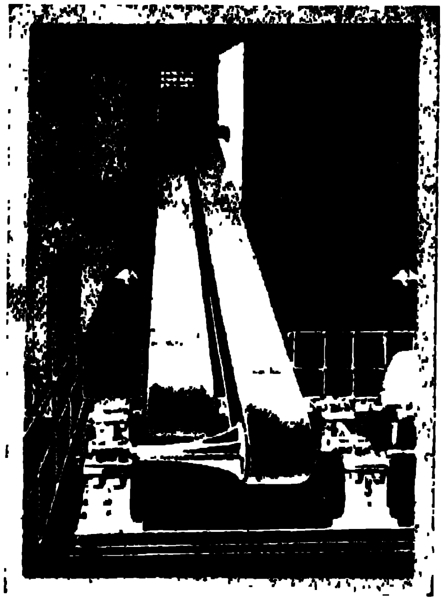
Particulars and prices on application.

Belting.

Mulcott "Multiplar Twintex" Hair Belting.

"Multiplar Twintex" Belting is made of the finest materials obtainable and is thoroughly waterproof, while the edges are specially made and hardened, to withstand fork action. It is not affected by changes in temperature and will run equally well in damp or heat.

In drawing the attention of our constituents to the prices of Belting on the following pages, we think it well to mention that only the very best qualities procurable of the respective kinds are stocked—a fact which should be carefully noted when comparing the prices.



On a **Motor** or **Dynamo** drive our **"Twintex" Belt** can be run slack and thus save power besides showing less wear and tear on the machine. **"Twintex"** will give far greater satisfaction than Leather, Balata, or Composition Belts.

For Heavy Driving and Main Drives in Oil Field Work, Cement, Paper Trade, and Textile Factories of all kinds, we strongly recommend **"Twintex."**

Every Belt is Guaranteed to give equal or better life and satisfaction than your previous best.

"Twintex" is used all over the world for all kinds of work and under all conditions.

All Belts are Waterproofed, Well Seasoned, and Stretched.

For High Speed Drives, Mules, Ring Frames, Looms, etc., use "Multiplar Twintex" Hair Belting with Special Face and Edge.

Indicated Horse Power Transmitted by "Multiplar" Belting.

Speed of Belt in feet per minute.	Width of Belt.—Standard Thickness.																
	2"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	36"	40"
600	3	6	9	12	18	22	25	29	32	36	40	44	47	50	54	64	72
700	3	7	10	14	20	25	29	34	38	42	45	50	54	58	63	76	84
800	4	8	12	16	24	29	34	38	43	48	53	58	63	68	72	86	96
1000	5	10	15	20	30	36	42	48	54	60	66	72	78	84	90	108	120
1200	6	12	18	24	36	43	50	58	65	72	79	86	93	100	108	130	144
1600	8	16	24	32	48	57	67	77	86	96	105	114	124	134	144	172	192
2000	10	20	30	40	60	72	84	96	108	120	132	144	156	168	180	216	240
2400	12	24	36	48	72	86	100	115	130	144	158	172	186	200	215	260	288
2800	14	28	42	56	84	100	118	134	151	168	184	200	218	236	252	302	336
3200	16	32	48	64	96	115	134	153	173	192	211	230	249	268	287	346	384
3600	18	36	54	72	108	129	150	172	195	216	237	258	279	300	322	390	432
4000	20	40	60	80	120	144	168	192	216	240	264	288	312	336	360	432	480
4400	22	44	66	88	132	158	184	211	238	264	290	316	342	368	395	476	528
4800	24	48	72	96	144	172	201	230	259	288	316	344	373	402	431	518	576
5000.	25	50	75	100	150	180	210	240	270	300	330	360	390	420	450	540	600

Other Speeds or Width in proportion.

Extra Thick Belts will transmit **33⅓ per cent. more power than the Standard Thickness.**
Triple Thickness Belts will transmit **66.2|3 per cent. more power than the Standard Thickness.**

Notes on Belt Driving.

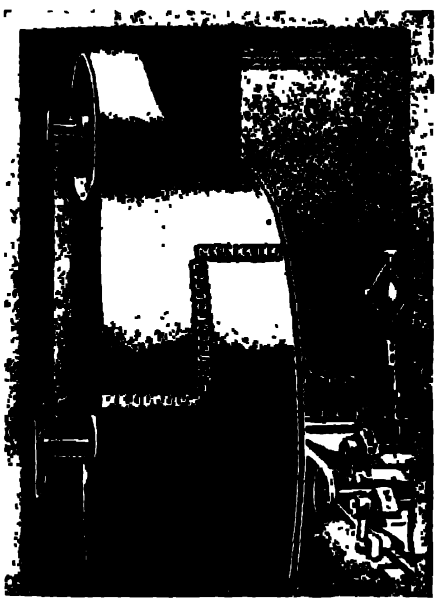
Avoid excessively tight belts. They are a constant source of expense, waste of power, and heating of journals, and often cause breakage of shafts.

Narrow belts are more effective per unit of sectional area than wide belts and long belts are more effective than short belts.

Owing to the consequent loss in arc of contact the ratios of two pulleys working together should not exceed about 6 to 1.

The convexity of pulleys to receive belts should equal ⅛ inch to ¼ inch in the width up to 12 inches, and in the same proportion for larger sizes.

The amount of convexity should be the same on the driving and driven pulleys.



If a belt cannot be kept in the centre of the pulleys examine the bearings and shafting. A belt will always run to the highest point, and will not run satisfactorily if the shafting and machinery are out of line.

For belts driving machinery from 1,000 to 2,000 feet per minute, and 3,000 to 3,500 feet per minute for main belt drives, agrees with good practice.

Compound Belts. When pulleys are too narrow to transmit the required power, a second belt can be put to run on top of the original belt. By this method of superimposed independent belts it is often possible to increase the driving power by 50 per cent.

The proportions of both width and thickness of belts should be such that they will transmit the power required when working under natural tension, due to the weight of the belt.

Slipping occurs when the belts are too slack, too narrow for their work, or working on pulleys which are too small in diameter, or when driving and driven pulleys are vertically superposed, or the centres are too short, or the atmospheric conditions are unsuited to the type of belt used. The heat generated under slipping conditions tends to make the rim of a cast metal pulley to expand, and exert undue strains at the point where the rim and arms join, often resulting in cracks and breakages, and also damage to the belt.

Thickness of Belts Suitable for Various Diameters of Pulleys.

Diameter of Pulley.	3" and under.	Over 3" to 4".	Over 4" to 12".	Over 12" to 16".	Over 16" to 18".	Over 18" to 24".	Over 24" to 36".
Approx. thickness Ply recommended	3/16" 3	7/32" 4	¼" 5	5/16" 6	⅜" 7	7/16 & ½ 8 & 9	9/16" 10

Belting.

Mulcott "Multiplar Twintex" Hair Belting.

Special quality impregnated extra strong Belting, guaranteed Pure China Yarn. **Designed to meet the demand for a strong and durable belt for Jute and other heavy Textile Mills, Factories and Workshops.**

Standard Thickness.

Width.	Price, per foot.	Width.	Price, per foot.
1½ inches	Rs. 0 9 0	7 inches	Rs. 2 12 6
2 ,, .. .	,, 0 12 0	8 ,, ...	,, 3 7 6
2½ ,, ...	,, 0 14 6	9 ,, ...	,, 4 1 0
3 ,, ...	,, 1 1 3	10 ,, ...	,, 4 9 6
3½ ,, .. .	,, 1 4 0	12 ,, ...	,, 5 14 0
4 ,, ...	,, 1 7 3	16 ,, Duplex Thickness	,, 10 3 0
4½ ,, ...	,, 1 10 6	18 ,, ,, ,, ..	,, 12 0 0
5 ,, ...	,, 1 15 0	20 ,, ,, ,, ..	,, 14 0 0
6 ,, ...	,, 2 6 0	Made in any width up to 40 ins.	
6½ ,, ...	,, 2 12 6	**Prices on application.**	

Prices for **Duplex** and **Triplex Thicknesses** up to 40 ins. wide on application.

"Mulcott" Solid Woven Extra Stout Cotton Belting.

For Driving, Elevating and Conveying.

"Mulcott" Solid Woven Cotton Belting is made of the finest yarns and thoroughly impregnated with waterproofing, making the belt impervious to atmospheric conditions.

Extra Stout.

Width.	Price, per foot.	Width.	Price, per foot.
2 inches	Rs. 0 11 3	6 inches	Rs. 1 12 9
2½ ,,	,, 0 13 9	7 ,,	,, 2 1 9
3 ,,	,, 1 0 0	8 ,,	,, 2 7 6
4 ,,	3 3	Made in any width up to 42 ins.	
5 ,,	8 0	**Prices on application.**	

Prices for **Single** and **Triple Thicknesses** up to 42 ins. wide on application.

Length of Belting in Rolls. A convenient way of calculating the length of belting in a roll without uncoiling is as follows:—

Add outer diameter of coil **in inches** to the approximate inner diameter **also in inches. Multiply first by the number of coils and then by 0.1309. The result is length in feet.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Leather Belting

by

The Chas. A. Schieren Co., New York, U. S. A.

Schieren Leather Belting is tanned in their own tanneries by the long-time process with pure Oak Bark. It is the slow natural way and best preserves the texture and fibre of the leather.

The thickness of the belting is uniform There are no weak parts—no matter of what quality. The joints are cemented with a special cement and are smooth and even. The stretch is the minimum. The leather is double-stretched in the piece, and afterwards the belting itself is stretched. Only sufficient stretch is left to make the belt an efficient transmitter of power.

"Duxbak" Leather Belting is made by a special Schieren process which renders it impervious to water, steam, oil and acid fumes. It is extra stretched and built to meet the operating conditions of the most exacting drives.

Prices:

Size .. Ins.	1	1½	1¾	2	2½	3	3½	4	5	6	7	8	9	10	12	
Single .. **Rs.**	0-10	0-15	1-2	1-4	1-9	1-14	2-3	2-8	3-2	3-12	4-6	5-0	5-10	6-4	7-8	per ft
Light Double „	..	..	..	2-2	2-11	3-3	3-12	4-4	5-5	6-6	.	.	..	.	..	„ „
Heavy Double „	..	..	.		..	3-12	4-6	5-0	6-4	7-8	8-12	10-0	11-4	12-8	15-0	.. „

"Bull's Head" is a strictly first quality belting manufactured from selected centre strips of the hide. It is recommended for general service on textile machinery, motors and heavy machine shop drives.

Prices:

Size .. Ins.	1	1½		2½	3	3½		5	6	
Single **Rs.**	0-9	0-13-6	1-2	1-6-6	1-11	1-15-6	2-4	2-13	3-6	per ft.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Leather Belting.

" Electric " Special Quality Belting is built specially for weaving machinery drives. It is waterproof treated to withstand the effects of moisture and humidity ever present in weaving sheds. Stocked in the standard sizes for cotton and jute looms.

ELECTRIC
TRADE MARK

Prices:

Size	Ins.	1½	1¾				
Single	**Rs.**	**0-10-6**	**0-12-3**	**0-14-0**	**1-1-6**	**1-5-0**	per ft.

" Rock Oak " offers splendid value for general transmission purposes. While on a price level with Fabric Beltings, it gives all the service of a good leather belt.

Prices:

Size	Ins	1	1½	2	2½	3	3½	4	5	6	
Single ..	**Rs.**	**0-6**	**0-9**	**0-12**	**0-15**	**1-2**	**1-5**	**1-8**	**1-14**	**2-4**	per ft.
Double	..			**1-8**	**1-14**	**2-4**	**2-10**	**3-0**	**3-12**	**4-8**	.. ..

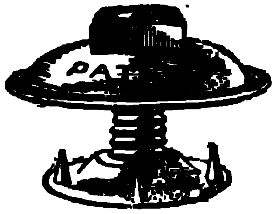
Endless Cone Belts	**Prices on application.**
Round Leather Belts	
Leather Link Belts	
Belt Lacing	
Hydraulic Leathers	

Endless Leather Belts for Motor drives a Speciality.

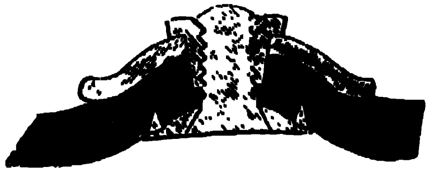
Belt Fasteners.

Jackson's Patent Oval Fasteners.

With Concave and Convex Washers.



This fastener is used largely all over the world for Heavy Driving Belts for Lap and Saddle Back Joints, and is well-known as being a most satisfactory fastener for Paper Mills, Cement Works, Iron Works, etc., where belts are required for Heavy work.



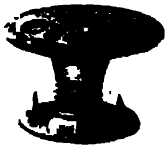
Diameter of Bolts	Ins.	¼	$\frac{5}{16}$	⅜
Length of Screws		⅞, 1, and 1¼	1, 1¼ and 1½	1⅜, 1½ and 1¾
Suitable for Belts		2" to 6" wide	4" to 10" wide	8" and upwards
Price, per doz.	**Rs.**	**1 12 6**	**2 10 9**	**2 15 0**

Jackson's Patent Button Plate Fasteners.

This type of fastener is suitable for all kinds of Belting for Light Drives, and is specially suited for Belts on Cones, Fans, Sawing and Planing Machines, Dynamos, etc.

Size.		B	C	D	F
Length of Bolts	Ins.	⅝	⅝	¾	¾ and 1
Length of Plate	"	$1\frac{9}{16}$	$1\frac{11}{16}$	$1\frac{15}{16}$	2⅛
Centre of Bolts .. .	"	¾	$\frac{13}{16}$	$\frac{15}{16}$	$1\frac{1}{16}$
Suitable for Belts . ..	"	Up to 3"	Up to 4"	Up to 5"	Up to 8"
Price, per doz.	**Rs.**	**1 14 0**	**2 4 0**	**2 14 0**	**3 12 0**

Jackson's Patent Button Fasteners.

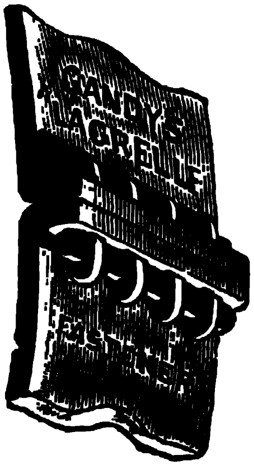


These Button Fasteners are made to dispense with rivets and laces, and, where laces are apt to break, one or two fasteners will make the joints good again.

Size		No. 1.	No. 2.	No. 3.	No. 4.
Length of Bolt	Ins.	⅝	⅝	¾	¾ and 1
Suitable for Belts	"	¾" and 1"	Up to 4"	Up to 5"	Up to 6"
Price, per doz	**Rs.**	**1 0 0**	**1 4 0**	**1 8 0**	**1 12 0**

Keys for use with Button Plate and Button Fasteners.

Price, As. 8 each.



Belt Fasteners.

Lagrelle's Belt Fasteners.

Recommended for all kinds of driving and especially for high-speed machines, such as Dynamos, Fans, etc. The running is very smooth, there is no "jump," the joint is made in a few minutes, and they are practically indestructible.

Size No.		1						8
Bars, per yard	·· Rs.	1 0 0	1 4 0	1 8 0	1 8 0	2 0 0	2 0	3 4 0
Loops, per dozen··	„	1 12 0	2 0 0	2 8 0	3 12 0			6 0 0

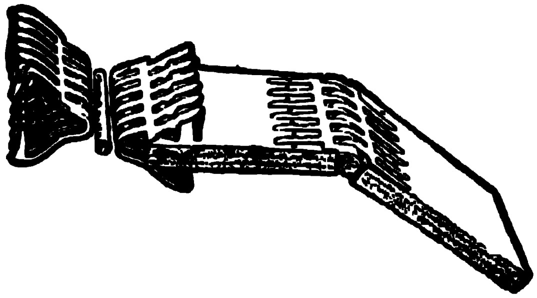
For Belts, Width	·· Ins.	2	2½	3	4	5	6	8	10	12
Price, per set	·· **Rs.**	0 11 0	0 14 6	1 1 6	2 2 0	2 4 0	3 0 0	3 8 0	5 0 0	6 0 0

"Alligator" Flexible Steel Belt Lacing.

For Leather, Rubber, Hair, Cotton, or Canvas Stitched Belting.

The double row of teeth on both sides of belt will hold satisfactorily under any conditions of service. Lacing can be broken with fingers at indentation on inside of bar to obtain required length of about ¼ inch less than width of belt.

No tool is required other than a hammer.



Size No.	For Belts.	Contents of Box.	**Price, per Box.**
20	Up to $\frac{3}{16}$" thick.	60" in 12" lengths.	Rs. 10 8 0
27	„ „ $\frac{9}{32}$" „	96" „ 12" „	„ 13 0 0
45	„ „ $\frac{3}{8}$" „	48" „ 12" „	„ 13 8 0
55	„ „ $\frac{7}{16}$" „	48" „ 12" „	„ 14 0 0
65	„ „ ½" „	48" „ 12" „	„ 15 0 0

Solid Steel Belt Punches.

Approx, diam.	·· **Ins.**	$\frac{3}{16}$	¼	$\frac{5}{16}$
Price, each ..	·· **Rs.**	0 9 0	1 0 0	1 4 0

Best Brown or White Belt Laces. Rs. 1-12 per lb.

"Kasenit" Case-Hardening Compound.

No. 2 Grade for General Workshop Purposes.

"**Kasenit**" is always equally effective under different heat conditions It is economical in use, non-poisonous, non-inflammable, and non-explosive, and it uniformly and efficiently case-hardens all kinds of Iron and Steel.

For ordinary Shop use and Open-hearth Hardening Supplied to H. M. Arsenals, Dockyards and India Office.

In 14-lb. tins .. . . **Rs. 2-4** per lb.

Carbide of Calcium.

First class quality, freshly produced from Welsh anthracite and fully guaranteed in accordance with the rules of the British Acetylene Association.

In 1-cwt. kegs .. .. **Rs. 28-0** per cwt.

Stantonite.

Stantonite Patent Flooring Composition for flooring and water-proofing walls, tanks and reservoirs by Messrs. The Stanton Ironworks Co., Ltd., is impenetrable and non-absorbent. It not only seals the minute interstices but bonds the surrounding structure forming a dense compact homogenous surface wear-proof, water-proof, oil proof and dustless.

In bags of 1 cwt. .. .. . . **Rs. 56-0** per cwt.

Sparking Plugs for Motors.

Champion Plugs for Ford Cars	**Rs. 3-8**	each.
K. L. G. Plugs ½ in taper thread for Ford and American cars . ..	„ **3-12**	„
Lodge Plugs C3 metric thread for English cars	„ **4-8**	„

Country and Indigenous Stores.

Acid, Muriatic, exclusive of containers	Rs.	0	4	6	p. lb.
Bamboos	„	81	0	0	p. %
Bricks No. 2, Country	„	27	8	0	p. %o
Brooms, Country	„	7	8	0	p. md.
Brushes, Quill	„	0	7	6	each
Baskets, Cane, large	„	1	1	6	each
„ „ small	„	0	10	0	each
Chalk White	„	5	0	0	p. md.
Cloth, Gunny, for packing	„	20	10	0	p. % yds.
Coir Yarn	„	20	0	0	p. md.
Cotton, Waste	„	0	10	0	p. lb.
Cowdung, for foundry use	„	0	10	0	p. cwt.
Firewood	„	1	1	6	p. md.
Glue	„	0	8	0	p. lb.
Jute Waste, No. 1	„	15	0	0	p. md.
„ „ No. 2	„	12	14	0	p. md.
Lime	„	100	0	0	p. % mds.
„ Stone, F. O. R. at Quarries	„	6	4	0	p. ton
„ Caustic	„	3	12	0	p. md.
„ Chloride of	„	22	8	0	p. cwt.
Logline	„	0	5	0	p. bdle.
Mugra Mud	„	18	12	0	p. % mds.
„ Sand	„	47	8	0	p. % mds.
Oil, Kerosine, Victoria Brand, case of 2 tins	„	7	4	0	p. case
„ „ Elephant „ „ „ „ „	„	8	2	0	p. case
„ Linseed, Raw, in barrels or drums (drums extra)	„	3	9	0	p. gall.
„ „ Double Boiled, in barrels „ „	„	3	12	0	p. gall.
Oxygen Gas, exclusive of cylinders	„	0	2	0	p. c. ft
Panel Pins, Steel	„	0	5	9	p. lb.
Phenyle, Best English, in 1 gall. drum	„	3	7	0	p. gall.
Pumice Stone	„	0	6	3	p. lb.
Putty Glaziers	„	0	3	9	p. lb.
Potash	„	2	5	0	p. lb.
Resin	„	0	4	9	p. lb.
Rope, Hemp, Manilla, to Admiralty strain	„	62	8	0	p. cwt.
„ „ „ ordinary	„	56	4	0	p. cwt.
„ Coir, best Maldive	„	24	0	0	p. cwt.
Sieves, Round or Square, according to size from	„	1	8	0	each & upwds.
Soap, Soft	„	25	0	0	p. cwt.
Soap Stone	„	4	6	0	p. md.
Soda Carbonate	„	11	4	0	p. cwt.
„ Caustic	„	0	10	0	p. lb.
Soorkey, fine screened	„	72	8	0	p. % mds.
Spun Yarn		26	4	0	p. cwt.
Straw		7	8	0	p. kahn.
Sulphur or Brimstone Stick		0	5	0	p. lb.
Turpentine—oil in 5 gallon drums		2	8	0	p. gall.
Twine, English, Sewing		2	6	0	p. lb.
„ Country		0	7	6	p. lb.
Yellow Ochre		7	8	0	p. cwt.

Prices subject to market fluctuation.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Asbestos Packing.

Genuine Asbestos Plaited Packing.

This packing is composed of the finest Asbestos Fibre and is plaited throughout with the longest lengths of fibre procurable.

It is specially valuable for the **Glands of Locomotives and other Engines** working at high speeds and pressures, and has the advantage of not charring and thereby being drawn into the cylinders.

Used for packing the Glands of Piston Rods, **Valve** Spindles, Pump Plungers, Gauge Glasses and Glands of all kinds.

Stock sizes:—¼ in., ⅜ in., ½ in., ⅝ in., ¾ in., ⅞ in. and 1 in. .. **Rs. 1-12** per lb.

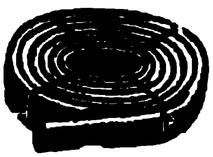
Dick's "Parmo" Asbestos Lubricated Packing.

Thoroughly lubricated and graphited. The lubricant is forced into every strand and part of the packing in such a manner that it makes the packing self-lubricating and prevents it from ever becoming hard in the gland.

Specially recommended for **Piston Rods, Expansion Joints, Stop Valves, Spindles,** etc.

Stock sizes:—⅜ in., ½ in., ⅝ in., ¾ in. and ⅞ in. .. .. .. **Rs. 3-4** per lb.

Asbestos Rubber Proofed Tape.



Composed of Asbestos cloth proofed with rubber to resist both heat and water, and is very useful from the fact that it can be used on any shape or size of joint. It is perfectly pliable and will bend to any curve.

Stocked in Rolls:—½ in., ¾ in., 1 in., 1¼ ins. and 2 ins. wide by ⅛ in. and ¼ in. wide .. .. **Rs. 1-14 per lb.**

Asbestos Paper 1|64 in. thick **1-2**

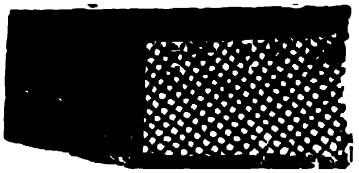
Asbestos Yarn.—Used for packing small **Stuffing Boxes, Gauge Glasses** and other small joints .. .. **Rs. 2-0 per lb.**

Asbestos Boiler Composition and Lagging to suit any requirements.

Prices on application.

Hydraulic Packing.

Genuine Diamond Koh-i-Noor Yellow Greased Packing.



One of the most suitable packings for **Hydraulic Pumps, Lifts** and all other **Hydraulic Work.** It is composed of pure Flax and thoroughly impregnated with Russian Tallow. The plait makes it soft and pliable, while at the same time strong. It keeps the rods in perfect condition and creates little friction, owing to its soft and greasy nature.

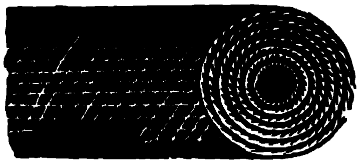
Stock sizes:—⅜, ½, ⅝, ¾, ⅞, 1, 1¼, 1½ and 1¾ ins. **Rs. 2-0** per lb.

Frictionless Greasy Hemp Packing.

Made of best quality Hemp thoroughly impregnated with Tallow. It is used for all **Hydraulic Work, Water Glands of Pumps, Stern Glands,** etc.

Stock sizes:—½, ⅝, ¾, ⅞, 1, 1¼, 1½ and 1¾ ins . .. .. **Rs. 1-8** per lb.

Dick's Canvas Core Packing.



Dick's Canvas Core Packing is made from good quality Cotton Duck or Sailcloth, and is bound together by the very strongest and toughest rubber solution, deeply frictioned into the cloth.

Recommended for all classes of **Pump Work.**

Stock sizes:—¼, ⅜, ½, ⅝, ¾ and ⅞ in. .. .. **Rs. 1-11** per lb.

Core Packing, Round and Square.

Stock sizes:—¼, ⅜, ½, ⅝, ¾, ⅞ and 1 in. .. .. .. **Rs. 1-4** per lb.

Electra Metallic Packing.

Does away with ordinary packing and is easily cut in lengths to form rings to suit all sizes of rods.

Stock sizes:—¼, ⅜, ½, ⅝, ¾, ⅞, 1, 1⅛ and 1¼ ins. .. .. **Rs. 10-0** per lb.

Millboard, Jointing, Etc.

Jessop's No. 1 Joint Sheeting.

For High Pressure Work.

This sheeting is made from a mixture of pure Asbestos Fibre, combined with Vulcanized Rubber, and makes perfect joints on **Steam, Water Pressure, Ammonia, Oil, Motor,** and all **Internal Combustion Engines.**

Can generally be used over again, as it does not stick much to the faces, especially the Graphited Sheeting, which is treated with Graphite which helps it to resist heat, and also come away clean from the flanges.

Stocked in **Plain** or **Graphited Sheets,** $\frac{1}{16}$ in. and $\frac{1}{8}$ in. thick, and 48 ins. square.
Rs. 2-12 per lb.

Asbestos and India-Rubber Sheeting.

Made of Asbestos Cloth proofed with Rubber to resist both heat and water, and is also made with Brass Wire woven in it.

Specially recommended for unfaced joints, also where there is any lodgement of water and for hot and cold Water Pipes, etc.

Stocked in Rolls $\frac{1}{8}$ in. thick.

Metallic. Rs. 1-8 per lb.
Non-Metallic. „ 1-14 „

Asbestos Millboard.

This is used for making all kinds of joints, and is easily cut with a knife to the shape required. When being used to make a joint with rough surfaces, if it is dipped in water, it is rendered sufficiently soft to take up a very rough surface.

Also largely used for the lining of Railway Carriages, both sides, floor and roof, as a fire preventative, and also as a heat insulator.

Stocked in Sheets :—$\frac{1}{16}$ in., $\frac{1}{8}$ in. and $\frac{1}{4}$ in. thick, and 40 ins. square. **As. 6 per lb.**

Asbestos Fibre Sheets.

For both outside and inside work. These sheets are used for Partitions, Panelling, Ceilings, and also in some cases for Roofings. They can be varnished, or painted; if for outside work, they should be painted. They are sound-proof and fire-proof, and joints can be covered with wooden fillets.

Sizes and Prices on Application.

Insertion Cloth, Hydraulic Leathers, Etc.

India-Rubber Insertion.

A perfectly safe and reliable jointing for Water, Oil, and other liquids. Made with an insertion of canvas in the middle, and is stronger than pure rubber sheet, but the sheet is more elastic.

Stocked in Rolls:—$\frac{1}{16}$ in. and $\frac{1}{8}$ in. thick .. .. .. **Re. 1-0 per lb.**

India-Rubber Sheeting.

Used as a jointing material for many purposes.

Stocked in Sheets:—4 feet square in all thicknesses from $\frac{1}{8}$ in. to 1 in. rising by $\frac{1}{8}$ in.

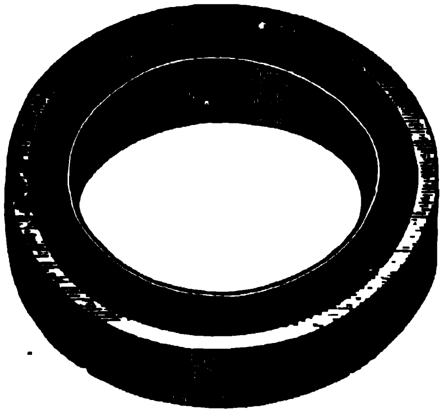
Red .. .. **Rs. 2-4** per **lb**

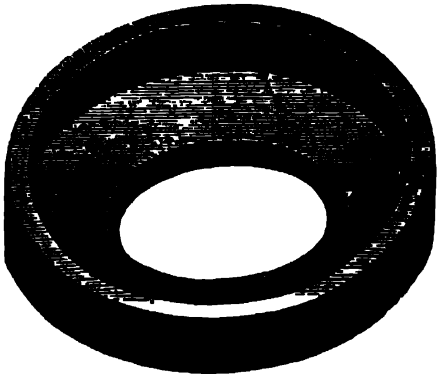
Grey .. .. **„ 2-0 „**

Lead Wool for Socket joints on Cast-iron Pipes .. .. .. **Rs. 48-0 per cwt.**

Lead Wire .. .. **As. 11** per lb. or **Rs. 70** per cwt.

Hydraulic Leathers.





Best English Hydraulic Pump Hides.

Rs. 2-6 per **lb.**

Pump Buckets, made to any size. **Re. 1-0** per inch diam. outside.

Hydraulic Neck or Ram Leathers.

Rs. 3-0 per inch diam. inside.

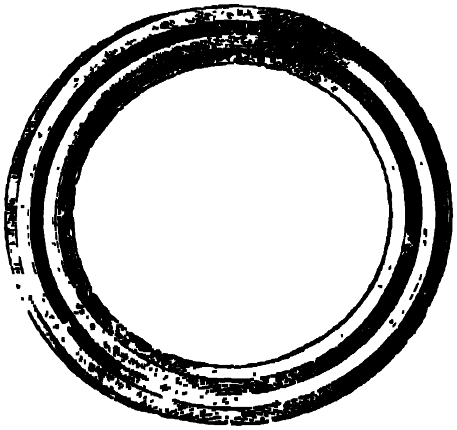
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

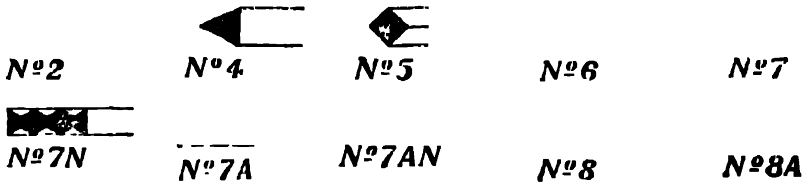
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hulburd's Patent Seamless Soft Copper and Brass Jointings.

As supplied to the principal Railway Companies, Engine and Boiler Makers, etc.





Standard Sections—Full Size.

This jointing makes an absolutely tight joint without red lead or any other filling, and is practically indestructible, as it may be used over and over again. It does not adhere to the faces of the joints, so that the latter can be opened at any time for inspection.

Used for all joints in Pipes, Steam Cylinders, Valve Chests, Boiler Steam Domes, Safety-Valve Seatings, Manhole Covers, Cleaning Doors, etc., etc.

Circular, Oval, Rectangular, or any special shape.
Prices on application.

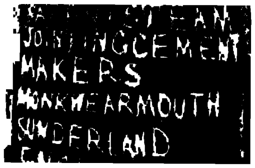
Brass Corrugated Joint Rings, Taylor's System.

This packing consists of corrugated metal rings, and is for the purpose of being placed in joints (with cement) in the joining together of metal pipes and other metal articles, thus making the joints steam and watertight with more certainty and greater durability than other methods.

These rings are suitable for either heat, wet, petroleum, or high pressure, boiler stays and boiler mountings, and by their use a tight joint can be made with the greatest certainty, and can be put to work as soon as made.

BORE	ins.	1	1¼	1½	2	2½	3	3½	4						10	12	15	18
Price, per dozen	Rs.	1-2	1-8	1-12	2-4	2-12	3-4	3-12	4-6	6-0	6-8	7-12	9-0	10-4	11-0	13-8	17-8	21-0

Scott's Cement.



This Cement is specially adapted for Sugar, Cotton, Woollen and other Mills for making joints perfectly tight on pipes running through the various departments of the Mills, it being much *cleaner* in its use than either Red or White Lead, and more durable, besides effecting a great saving of time and labour, as steam can be applied *immediately* after making the joint.

In kegs of	56	28
Price	**Rs. 29-4**	**32-0** per cwt.

Grade "A" Iron Steel Compound for foundry use for smoothing on to irregular surfaces of castings, etc.

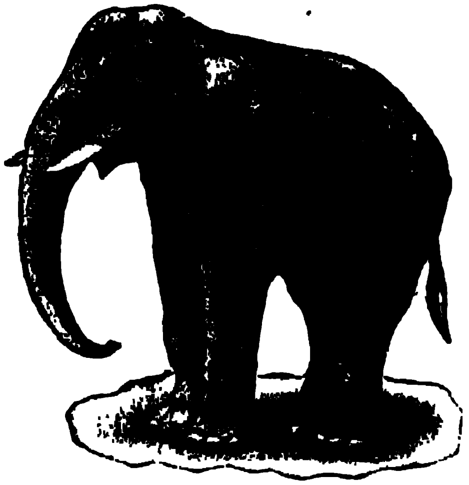
In 7-lb. airtight Tins .. .. **Price, Rs. 1-4** per lb.

Leads, Paint, Colours, Varnishes and Oils.

Manufactured by

Alexander, Fergusson & Co., Ltd., Glasgow.

Contractors to the India Office and the Principal Indian Railway and Shipping Companies.



The Elephant Brand.

As Sole Agents in India and Burma for Messrs. Alexander, Fergusson's products, we carry a large stock of White and Red Lead, White Zinc, stiff and mixed Paints, etc., and are in a position to quote for anything in this line our constituents may require.

Highest Award at the U. P. Exhibition, Allahabad, 1910-1911.

Owing to the variety of Paints manufactured by Messrs. Alexander, Fergusson and Co. we have found it possible to include only a limited number in a general catalogue such as the present. We shall be glad, however, to quote for any article in oil or colour not enumerated in the following pages and will thank our constituents to write to us stating their requirements.

The ultimate value of a paint depends upon the purity of its ingredients, their correct proportion to one another, and the care exercised in grinding and mixing—and perhaps the most important of these points is quality. The effect of the careful grinding and mixing is that the paint neither varies in its proportions nor colour and that any shade can be matched at any time.

White Lead.

This is made by the "Old Dutch" or "Stack" process of corrosion which, notwithstanding the various attempts to produce White Lead by short, easy and cheap methods, still more than holds its own. The "Elephant" Brand Genuine White Lead Paint is composed wholly of Pure Carbonate of Lead and ground in Pure Refined Linseed Oil.

It goes farther, lasts longer and in the end costs less than any other pigment, because of its body, spreading capacity and protective qualities.

Genuine White Lead, ground in oil,	½	cwt. kegs	**Rs.**	**60-0**	p. cwt.
,, ,,	1	,, ,,	,,	**57-8**	,,
,, ,, ,, ,, ,, ,,		casks	,,	**56-8**	,,
,, ,, ,, dry		kegs	,,	**55-8**	
,, ,, ,, ,,		,,	,,	**53-8**	
White Lead in oil for Joints,		casks	,,	**56-0**	

Special quotations for large quantities.

Red Lead.

Guaranteed to contain less than 2 per cent. Impurities.

The "Elephant" Brand Genuine Red Lead is unsurpassed for fineness of colour and grinding. A coat of this Red Lead mixed with Genuine Boiled Linseed Oil applied to iron after it has been carefully cleaned will be found to be one of the best anti-corrosives for all descriptions of iron work.

Genuine Red Lead, Dry, 1 cwt. kegs .. .. .. **Rs. 44-0** per cwt.

White Zinc Paint.

Alexander, Fergusson's Genuine Extra White Zinc Paint is made from Oxide of Iron specially selected for its whiteness, texture and freedom from impurities of every description.

It is ground to the consistency of butter under heavy Edge Runners, and through Triple-roller Granite Mills.

The Linseed Oil with which it is mixed is bleached water white in the Refinery, and every particle of musilage or colouring matter entirely eliminated.

It, therefore, possesses in marked degree all the essentials of good White Zinc Paint, purity, colour, smoothness and spreading capacity.

Genuine Extra White Zinc Paint, ground in oil, ½ cwt. casks .. .. **Rs. 62-0** per cwt.

Dry Colours.

Messrs. Alexander, Fergusson and Co. precipitate their own chemical pigments, and their works are equipped with the most up-to-date machinery for the manufacture of Dry colours.

Particulars and prices on application.

Cold Water Paint.

"Lapidesco" Paint.—This paint is impervious to weather and climate, is washable, odourless, sanitary, fireproof and suitable for all descriptions of inside and outside painting. It will not scale or rub off and is particularly suitable where a sanitary condition and fresh appearance necessitates frequent renewals, as in Stables, Hospitals, Public Buildings, Factories, etc., where the smell of Oil Paint is objectionable. "Lapidesco" can be applied to wood, plaster, brick, stone, or any solid surface; has a great covering capacity, and, in most cases, one coat will be found sufficient. Supplied in 24 standard shades, in 3½, 5 and 7-lb. packets, and in casks containing 1, 2 and 3 cwts.

Prices according to quantity.

Paste Distemper.

Alexander, Fergusson's Paste Distemper adequately meets the increasing demand for harmonious effects and more sanitary and healthful conditions in the decoration of the interior of Dwellings and Public Buildings. It is sanitary, sets hard, will not scale, crack, or rub off, and can be painted on or varnished, and may be used as a priming coat.

Particulars and Prices on application.

Special quotations for large quantities.

Prepared Paints.

Messrs. Alexander, Fergusson & Co.'s Works are well placed for turning out high-class paste Paints and Paints ready for use. They employ a number of fully qualified Chemists and can match samples both in shade and quality at the shortest notice.

Stiff Paints Ground in Oil.

Slate Grey, ½ cwt. casks, "Elephant" Brand	Rs. 40-0	per cwt.
„ „ 1 „ „ „	„ 38-8	„
Black Paint, Superfine, ½ cwt. casks, "Elephant" Brand ..	„ 38-8	„
„ „ „ 1 „ „ „ „ ..	„ 37-0	„
Brunswick Green, Superfine, ½ cwt. casks, "Elephant" Brand	„ 40-0	„
„ „ „ 1 „ „ „ „	„ 38-8	„

Prices of other Shades and Colours on application.

Paints Mixed Ready for Use.

Red Oxide Paint mixed ready	for use in 5 gallon	drums	Rs. 7-12	gall.
„ „ „ "Ricksha" Brand	„ „ „ 1 „	tins	„ 14-0	„
Lead Colour Paint	„ „ „ 5 „	drums	„ 7-12	„
„ „ „ "Ricksha" Brand	„ „ „ 1 „	tins	„ 14-0	..
Mid-Brunswick Green Paint ..	.. .. .. 5 ..	drums	„ 7-12	„
„ „ „ „ "Ricksha" Brand	„ „ 1 „	tins	„ 14-0	„
Dark Green Paint	„ „ „ 1 „	„	„ 14-0	..
Tangye's Green Paint ..	„ „ „ 1 „	„	„ 15-12	,
Black Paint	„ „ „ 5 „	drums	„ 7-12	„
„ „ "Ricksha" Brand ..	„ „ „ 1 „	tins	„ 14-0	„
Kinnoul White Paint ..	„ „ „ 1 „	..	„ 16-4	„
„ (Flat) „ „ ..	„ „ „ 1 „	..	„ 16-4	„
Gloss White „ ..	„ „ „ 1 „	drums	„ 14-0	„
White Silicate „ ..	„ „ „ 5 „	„	„ 7-12	..
Buff Colour „ ..	„ „ „ 5 „	„	„ 7-12	„
Red Roofing Paint, "Ricksha" Brand	„ „ „ 1 „	tins	„ 13-4	..
Micacious Oxide Natural Purple	„ „ „ 5 „	drums	„ 14-0	..

Prices of other Shades and Colours on application.

Shade Cards on application.

Miscellaneous.

Water-proof Dressing.—The "Elephant" Brand will be found a thoroughly effective water-proof dressing. It is glossy, durable and cheap and renders the canvas it is applied to very much stronger in resistance to the sun's rays. It should be well stirred before using, and if too thick, should be thinned with Genuine Boiled Linseed Oil. Messrs. Alexander, Fergusson & Co. make the following shades:—Red, Cream, Black, Yellow and Green

1 gallon tins, Rs. 7-12 per gallon.

Patent Driers in Oil, ½ cwt. casks, "Elephant" Brand	„ 37-8	per cwt.
„ „ „ „ 1 „ „ „ „	„ 36-0	..

Extra Super Stainers.
Hygienic Paints.
Genuine Linseed Oil Putty.
} **Particulars and Prices on application.**

Special quotations for large quantities.

Please note that the "gallons" of Alexander, Fergusson's Paints, etc., are Imperial Gallons.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,
JESSOP & Co. LTD
ENGINEERS
RANGOON, MADRAS, BOMBAY, LONDON.

Signal Enamel Paints.

We confidently recommend Signal Enamel Paints on account of its pure colour, great spreading capacity and moderate cost. The careful grinding imparts to the paint great spreading power; makes it work easily under the brush, and ensures a finish of exceptional smoothness. It is essential that Enamels should be bright, clear colours, dry hard with a glossy, non-brittle surface, and retain their lustre. These qualifications the "Elephant" Enamels possess.

Signal Red	Paint mixed ready for use in	1 gallon tins ..	**Rs. 37-0** gallon.
White	„		**25-0**
„ Green	„	1	„ **30-0** „
Brown Enamel	„	8 oz.	„ **16-8** doz. tins.
Azure Blue Enamel		8	„ **16-8** „

Prices for other Shades and Colours on application.

Varnishes.

COPAL VARNISH
ELEPHANT BRAND
MANUFACTURED BY
ALEXANDER FERGUSSON & COMPANY LTD
GLASGOW LEAD & COLOUR WORKS
GLASGOW

Messrs. Alexander, Fergusson and Company's Varnishes are becoming increasingly favourably recognised all over the world as thoroughly reliable to do efficiently the work for which they are recommended. They dry hard, flow freely under the brush and do not crack or bloom Special care is exercised in the choice of material and only such as are suitable for the purpose the article is applicable are used.

				Rs.
Pale Elastic Carriage Varnish.	Flash point,	94° Fahr	in 1 gallon tins	**18-4** gall.
„ Finishing Body	„		1	**21-8**
Superfine Gold Size	.. .. ..	87° ..	1 „ ..	**11-12**
„ Black Japan	.. .. ..	90° ..	1	**15-2**
„ Copal Varnish	.. .. ..	..	1	**10-8**

Ships' Composition.

Messrs. Alexander. Fergusson and Company have acquired the Patent Rights to manufacture these compositions under the style of "The Union Anti-fouling Composition Company, Limited," and their products after exhaustive Tests have proved quite equal if not superior to the best known in the market.

Anti-corrosive No. 1 for first coat or primer. The shade is dark approaching Indian Red.
½ cwt. kegs. **Rs. 105** per cwt.
1 .. .. .. **100** „

Anti-Fouler No. 3 is specially prepared for a warm climate for a second coating to go on top of No. 1. Shade Bright Red.

½ cwt. kegs. **Rs. 170 per cwt.**
1 „ „ „ **165** „

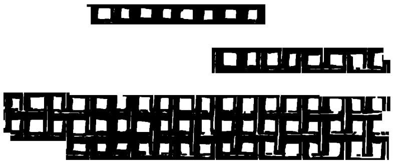
Boot Topping (Red) No. 1 for use from load line and upwards, generally to dry load line.
1 cwt. kegs. **Rs. 95 per cwt.**

Ironskin Paint for the holds of vessels, bridges, etc., and all manner of ironwork.
1 cwt. kegs. **Rs. 60 per cwt.**

Special quotations for large quantities.

Please note that the "gallons" of Alexander, Fergusson's Paints, etc., are Imperial **Gallons.**

Wirecloth.



Steel Wirecloth.—We stock only the best quality of Steel Wirecloth and have supplied large quantities for use in Rice Mills in India and Burma.

MESH	..	10×10	12×5	12×6
Width	.. feet	3	3	3
Price, per sq. foot	**Rs.**	**1-0**	**1-1**	**1-2**

Galvanized Wirecloth (Square Mesh).

MESH			8	8	8				
Gauge of Wire	S.W.G.	26	25	24	23	22	21	20	19
Price, per sq. foot	**Rs.**	**0 2 6**	**0 2 9**	**0 3 0**	**0 3 3**	**0 3 6**	**0 3 9**	**0 4 9**	**0 6 0**

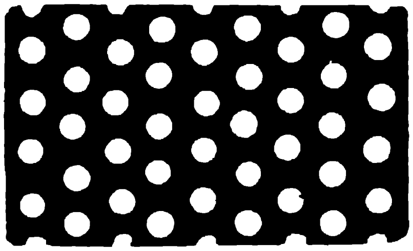
MESH		10	10	10	10	10	10	10	10	10
Gauge of Wire	S.W.G.	28	27	26	25	24	23	22	21	20
Price, per sq. foot	**Rs.**	**0 3 0**	**0 3 6**	**0 3 6**	**0 4 0**	**0 4 3**	**0 4 6**	**0 4 9**	**0 5 0**	**0 6 9**

MESH		12	12	12	12	12	12	12	12
Gauge of Wire	S.W.G.	29	28	27	26	25	24	23	22
Price, per sq. foot	**Rs.**	**0 3 0**	**0 3 3**	**0 4 0**	**0 4 6**	**0 4 6**	**0 4 9**	**0 5 0**	**0 6 0**

The above prices are for Rolls of 100 feet long and from 1 to 4 feet wide.
Prices for meshes 2 to 32 on application.

Brass and Copper Wirecloth.

MESH ..				10	12	14	16	18	20	30	40	60	80	100
Brass. **Price**, per sq. ft. **Rs.**	**0 9 6**	**0 9 6**	**0 9**	**8 6**	**0 12 0**	**0 12 0**	**0 9 6**	**0 9 6**	**0 10 0**	**0 14 6**	**1 15 0**	**2 4 0**	**3 2 0**	**3 14 0**
Copper. **Price**, per sq. ft. **Rs.**	**0 14 6**	**0 14 6**	**1 1**	**1 0**	**1 1 0**	**1 1 0**	**1 1 0**	**1 1 0**	**1 2 0**	**1 13 0**	**3 0 0**	**3 10 0**	**4 8 0**	**4 8 0**



Perforated Steel Sheets.

Sheets 6 ft. by 3 ft. Thicknesses 22G and 24G. All sizes of holes to suit the various requirements in Rice Milling.

Price, 22G. Rs. 10-4 per sheet.
„ **24G.** „ **9-8** „ „

Plain Fencing Drawn Wire.

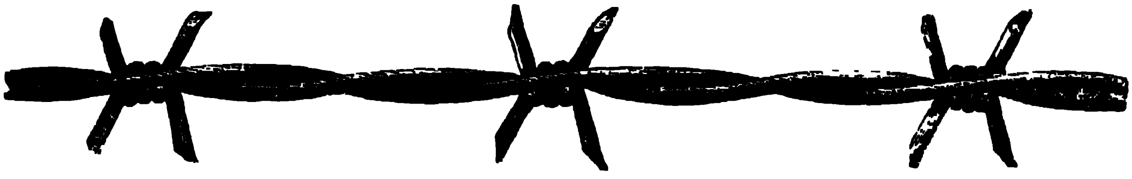
Mild Steel, Annealed, Galvanized.

Wire Gauge.	Approx. Weight per 100 ft.	**Price,** per cwt
4	14.3 lbs.	**Rs. 21-8**
6	9.8 „	
8	6.8 „	**22-0**
9	5.5 „	
10	4.6 „	**22-8**
11	3.6 „	**23-0**
12	2.9 „	**24-8**
14	1.7 „	**25-8**
16	1.1 „	**27-17**
18	.61 „	**34-8**
20	.34 „	**37-4**

The above wire is also suitable for straining Galvanized Iron Netting across Tea Leaf Withering Racks.

Steel Spring Wire **Rs. 0-11-0** lb. Brass Spring Wire **Rs. 1-8** lb.

Barbed Wire.



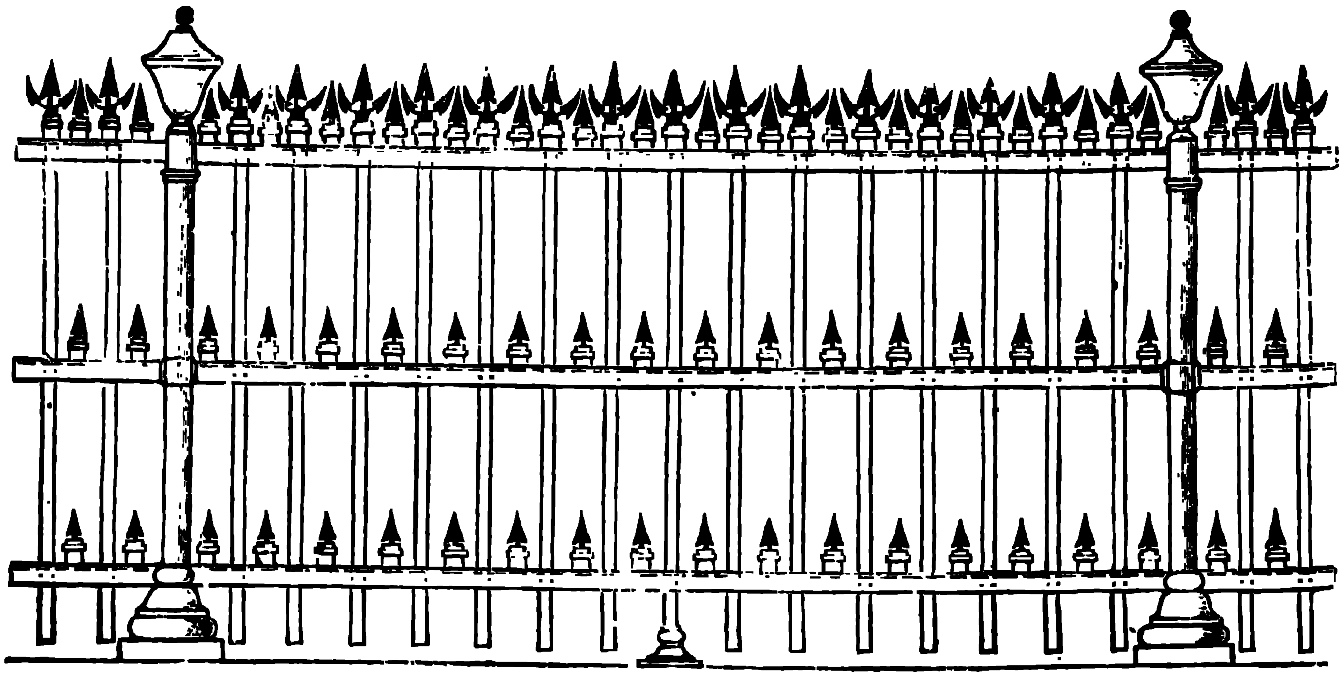
Galvanized Barbed Fencing Wire, thick set, 4 points 3 ins. apart. Approximately 440 yards =1 cwt.	**Rs. 27-4** per cwt.
Galvanized Staples 1 in. by 9G.	„ **35-4** „ „
„ „ 1½ ins. by 8G.	„ **32-8** „ „
No. 4/7 Strand Galvanized Fencing Wire	„ **30-8** „ „

Approximate weight 1 cwt. to 307 yards.

Straining Eye Bolts, Levers and Brackets **Prices on application.**

Heavy Spiked Fencing.

Suitable for Dock and Railway Enclosures, Etc.



The above illustrates a very strong steel channel framed fencing 6 ft. high, as constructed by us in large quantities for the Commissioners for the Port of Calcutta for the **Strand Road** Boundary to their Jetties. It is constructed in bays of about 10 ft. between centres of W.-I. columns. The spear-points and tridents are made of Cast-Iron.

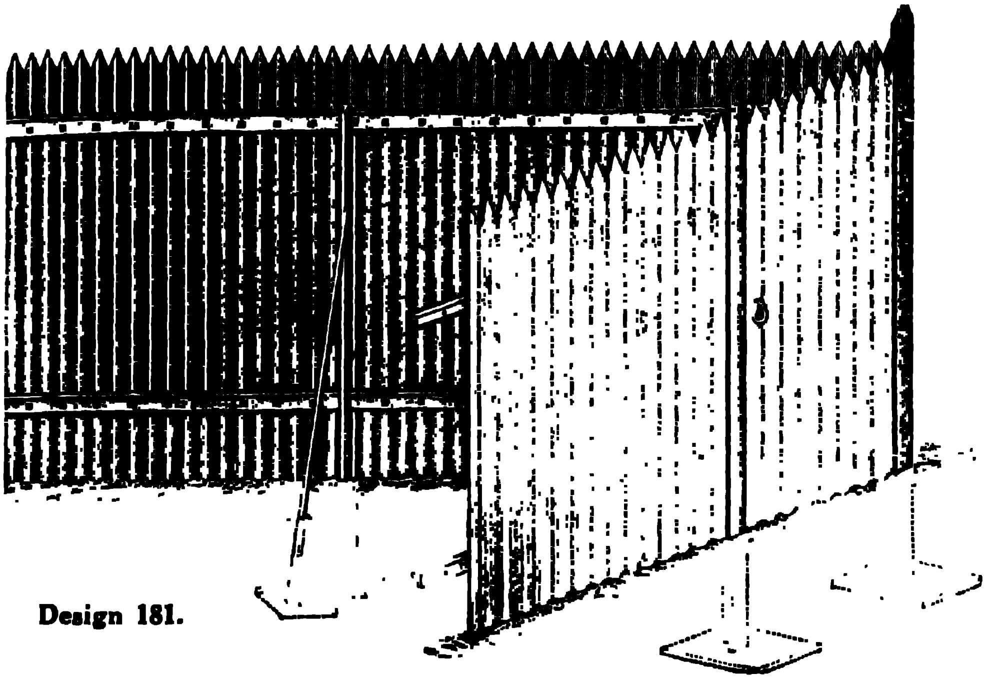
Price, per lineal foot, **Rs. 34-0.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Galvanized Corrugated Sheet Fencing.



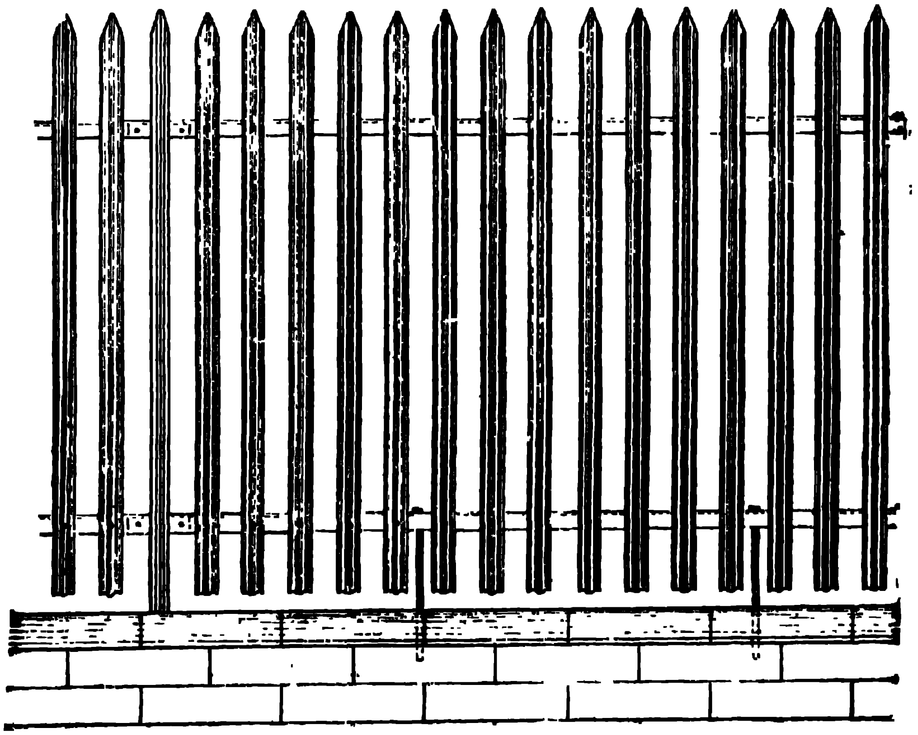
Design 181.

Fences over 6 ft. high have three Horizontal Bars of Angle Iron. Standards 9 ft. apart with underground sole plate and stay to each. If required, the serrated sheets only may be supplied for fixing to wood frame work.

Height.	T. Iron Standard.	Angle Iron Stays.	Galvanized Sheet.	Price, per lineal yard.	Price of Wicket Gate.
5 feet	2"×2"×¼"	1¼" × 1¼" × 3/16"	24 B.W.G.	Rs 10 4 0	Rs. 160 0 0
6 ,,	2"×2"×¼"	1½" × 1½" × 3/16"	24 B.W.G.	,, 11 8 0	,, 170 0 0
6 ,,	2"×2"×¼"	1½" × 1½" × 3/16"	22 B.W.G.	,, 12 8 0	,, 180 0 0
7 ,,	2"×2"×¼"	1½" × 1½" × 3/16"	22 B.W.G.	,, 15 4 0	,, 195 0 0
8 ,,	2"×2"×¼"	1½" × 1½" × ¼"	22 B.W.G.	,, 16 12 0	,, 210 0 0

Note.—Sheets only are Galvanized.

Corrugated Steel Pale Fencing.

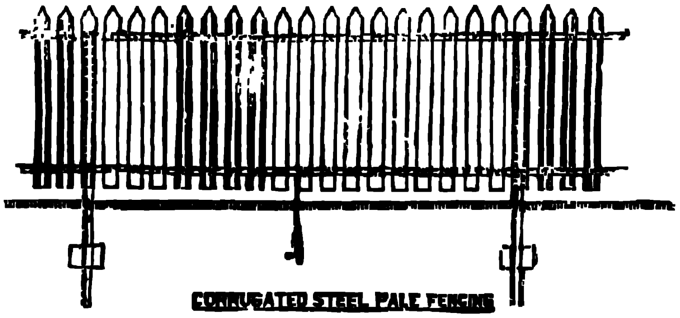


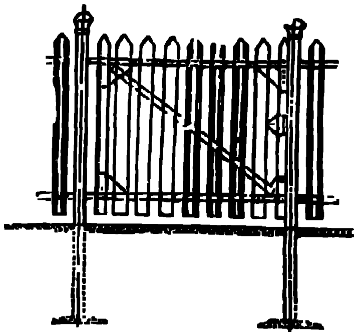
We illustrate above a special kind of Pale Fencing suitable for building into low walls. No back stays are required. We have supplied large quantities of this fencing for use in India and Burma.

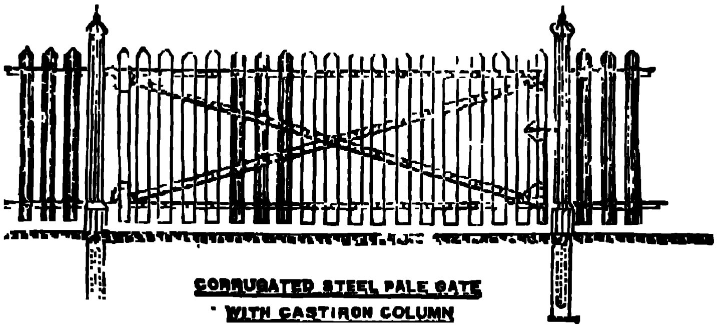
Price of Steel work 2 ft. 9 ins. high above coping Rs. 2-4 per ft.

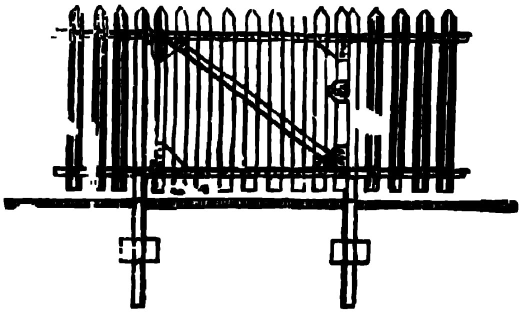
Jessop's Standard Pale Fencing.

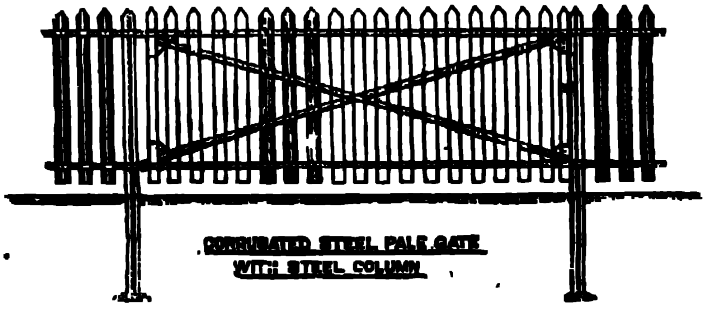
Standards 9′ 0″ apart. Pales 16 Gauge.

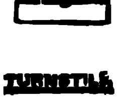

CORRUGATED STEEL PALE FENCING


CORR. STEEL PALE WICKET GATE
WITH CAST IRON COLUMN


CORRUGATED STEEL PALE GATE
WITH CAST IRON COLUMN


CORR. STEEL PALE WICKET GATE
WITH STEEL COLUMN


CORRUGATED STEEL PALE GATE
WITH STEEL COLUMN


TURNSTILE

Prices and Particulars of

Jessop's Standard Pale Fencing.

Oiled and Packed for Rail or Shipment.

Height above ground.	Standards L. Steel.	Horizontal L. Steel	Stays.	Price with pales at 6" centres. per yard.		Price with pales at 7½" centres. per yard.	
				Rs.	A.	Rs.	A.
4' 0"	1½"×1½"×¼"	1½"×1½"×$\frac{3}{16}$"	⅝" Square	8	12	8	0
4' 6"	1¾"×1¾"×¼"	Ditto	Ditto	9	14	9	0
5' 0"	1¾"×1¾"×¼"	Ditto	Ditto	10	12	9	12
6' 0"	2"×2"×¼"	Ditto	¾" Square	12	8	11	4
7' 0"	Ditto	Ditto	Ditto	14	14	13	8
8' 0"	Ditto	Ditto	Ditto	16	8	15	0

The Verticals are also fitted with pointed pales and consequently the fence is unclimbable throughout its entire length instead of having a vulnerable point at a blunt Tee upright, as is common with most types of pale fencing.

Prices of similar fencing but with pales cut and corrugated from plain galvanized sheets 50 per cent. extra.

Corrugated Steel Pale Wicket Gate:—3 ft. 6 ins. wide with cast-iron columns as shown, 4 ft. high .. .. **Rs. 120-0**

We seldom make them smaller than this, but will be pleased to quote special prices on application.

Larger sizes up to 6 ft. by 6 ft. and **Rs. 4-8** for every 6 ins. in height and **Rs. 4-0** for every 6 ins. in width.

If fitted with Steel Columns **20** per cent. less.

Single or Double Leaf Gates larger than 6 ft. by 6 ft.

M. S. Columns. **Price** per pair 4 ft. high	**Rs.**	**65-0**
Price per foot increase in height	„	**3-0**
Cast-iron Self-fixing Bases. **Price** per pair 4 ft. high .. .	„	**78-0**
Price per foot increase in height	„	**4-0**
Gate **Price** per square foot of opening	„	**3-0**
Turnstiles as shown, Price	„	**75-0** each.

Recording Turnstiles. Prices on application.

Railway Type Wire Fencing.

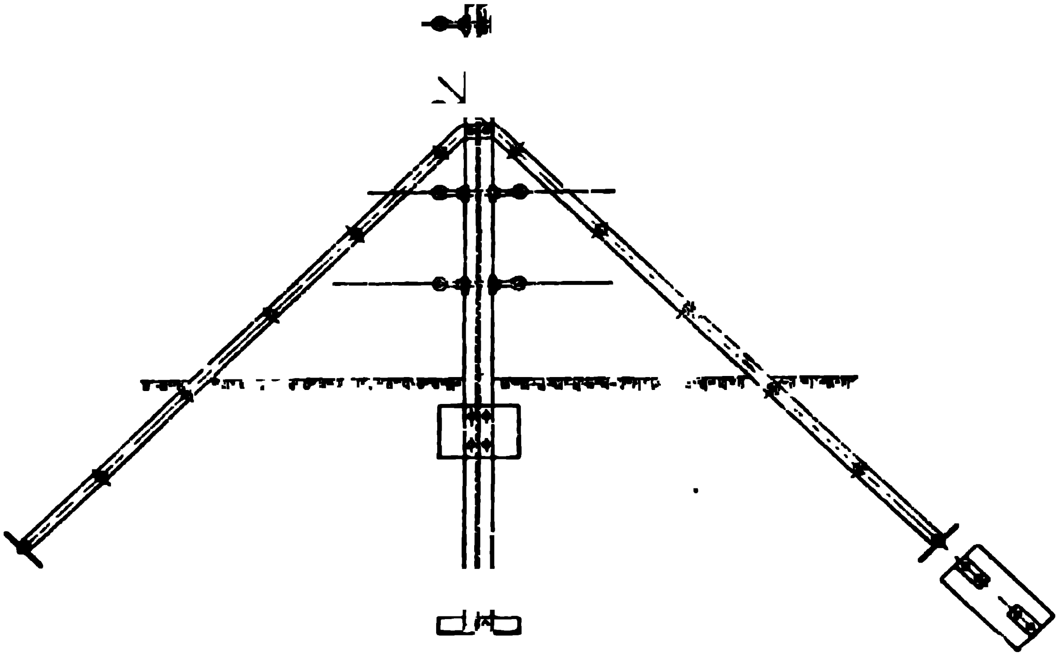


Fig. 1.

Straining Posts—

8 per mile.

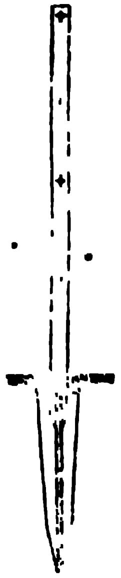


Fig. 2.

Ordinary Posts—

470 per mile.

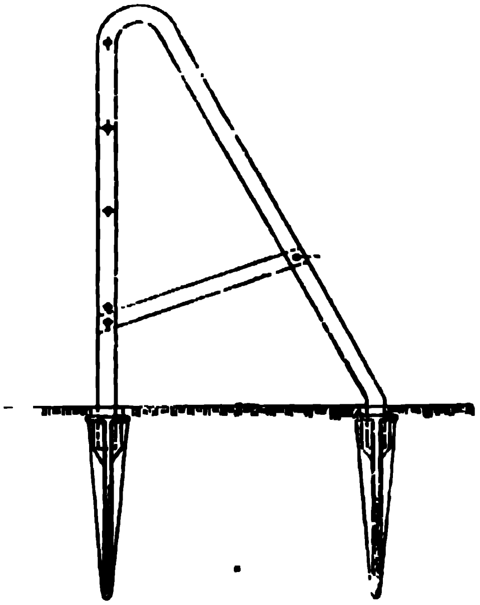


Fig. 3.

Stiffening Posts—

50 per mile.

The above Wire Fencing is used extensively on Indian Railways for whom we have executed very important contracts.

Prices.

Straining Posts ..	Rs. 35-0 each	**Wire.**	
Corner Posts ..	30-0	Eyebolts	
End Posts	„ 24-8	⅜"×4"	**Prices on application.**
Stiffening Posts with two Cast-iron sockets ..	17-0	½"×10½"	
Ordinary Posts with one Cast-iron socket ..	7-8	¾"×4½"	

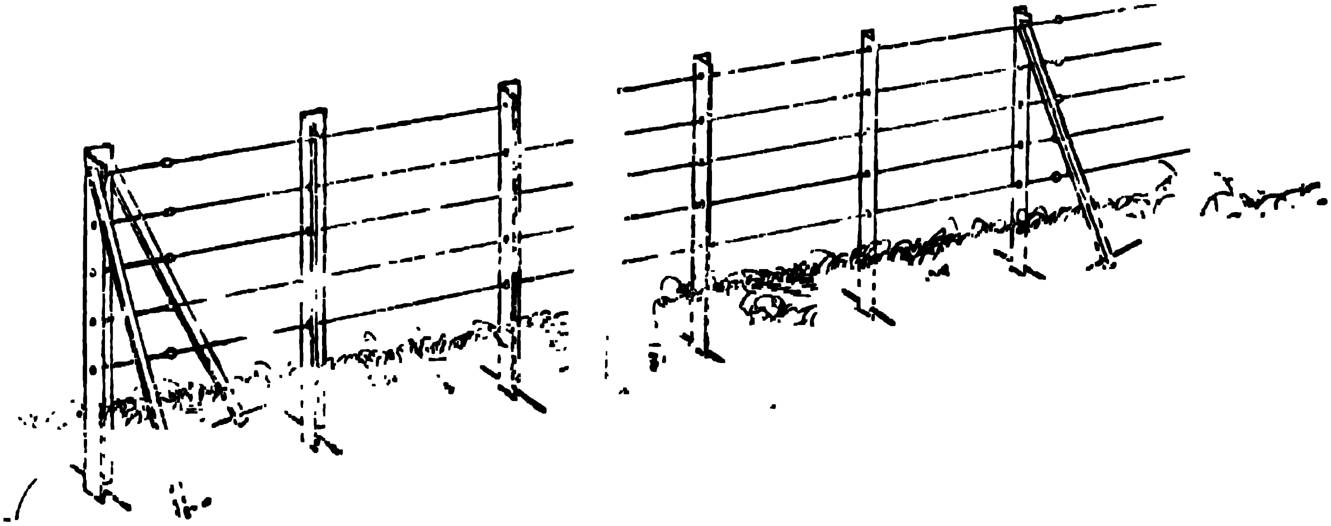
Price per straight mile complete with all fittings. Rs. 5,280-0.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Plain Wire Fencing.



This Fence stands 4 ft. high with 5 lines of specially tempered Galvanized Steel Wire. The Standards and Straining Posts are of Angle Steel provided with Anchor Bars to hold them securely in position.

No. 1. Fencing Specification.

Top line of wire No. 4 B.W.G., other lines 6 B.W.G., Standards 12 ft. apart, Straining Posts 250 yards apart.

Price, per straight mile, **Rs. 2,480.**

No. 2. Fencing Specification.

Top line of wire No. 6 B.W.G., other lines 8 B.W.G., Straining Posts and Standards as above.

Price, per straight mile, **Rs. 2,240.**

No. 3. Fencing Specification.

Top line of wire No. 6 B.W.G., other lines 8 B.W.G., Standards 18 ft. apart. Straining Pillars 350 yards apart.

Price, per straight mile. **Rs. 1,760.**

For quantities under one mile and for fencing round corners, prices proportionately higher.

Angle Steel Corner Posts, 4 ft. high,	**Rs. 13-8** each.	Straining Brackets	Prices on application.
Intermediate Standards, „ „ „	**3-0** „	„ Levers	
End Posts .. „ „ „	**12-12** „	„ Eyebolts	

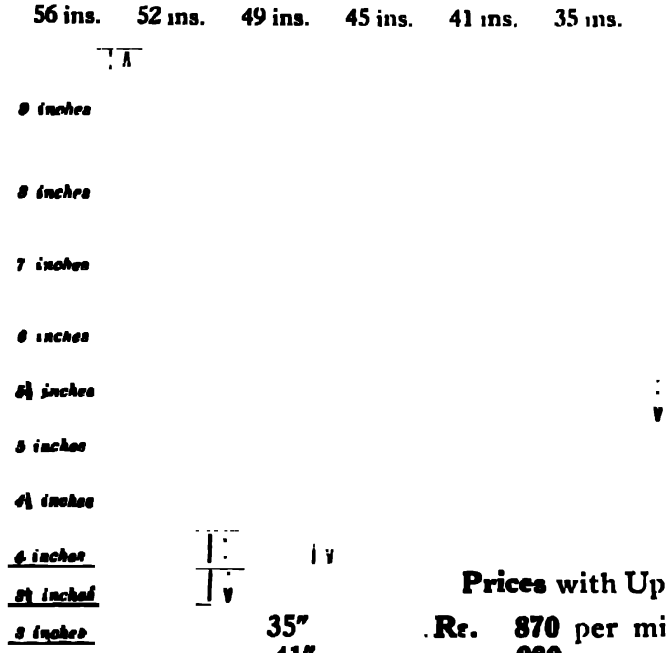
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Hercules" Wire-Woven Fencing.

The "Hercules" Fence is more easily, quickly, and inexpensively erected; unaffected by climatic conditions; infinitely stronger and vastly more durable than other wire-woven fencing. "Hercules" Fencing is rapidly growing in popularity amongst those who have land, crops, cattle, etc., to enclose.



"Hercules" Fencing

in Heights

35" 41" 45" 49" 52" & 56"

The Diagram at the side shows the actual measurements of spaces between the horizontal wires for all the sizes referred to. For example, Fencing 35 ins. high has 5 spaces from ground level upwards, as 5½ ins., 6 ins., 7 ins., 8 ins., 9 ins.

Upright wires in all sizes 6 ins. or 12 ins. apart.

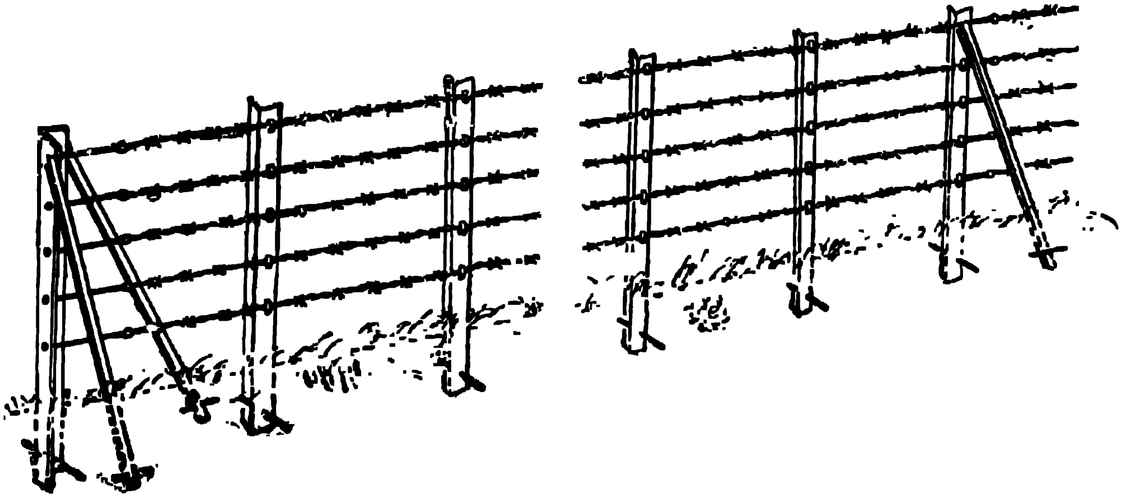
Upright wire	12 G.
Top wire	7 G.
Intermediate wire	11 G.
Bottom wire	9 G.

Prices with Upright wires 12" apart in rolls of 220 yards.

35"	Rs. **870** per mile.	49"	Rs. **1,120** per mile.
41"	**980** „ „	52"	„ **1,150** „ „
45"	**1,025** „ „	56"	„ **1,390** „ „

		35"	41"	45"	49"	52"	56"	height.
Angle Steel Corner Posts	Rs.	**8-0**	**9-0**	**10-0**	**11-0**	**12-0**	**13-0**	each.
„ „ Intermediate Posts	„	**2-4**	**2-8**	**2-12**	**3-0**	**3-4**	**3-8**	„

Barbed Wire Fencing.



This Fence is 4 feet high with 5 lines of Galvanized 2-ply 4-point Barbed Wire. Other particulars, the same as the plain Fencing (see page 191).

Price, per straight mile, Standards 12 feet apart, Straining Posts 250 yards apart .. **Rs. 2,460**
" " " " " 18 " " " " 350 " " .. " **1,880**

For quantities under one mile and for fencing round corners, prices proportionately higher.

Light Garden and Maidan Fencing.

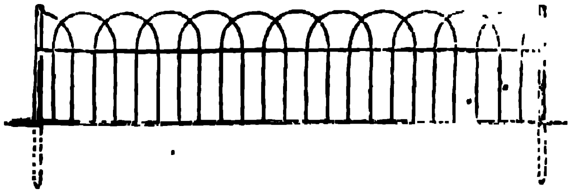


Fig. 56A.

Price, 12 ins. high .. Rs. 4-0 per yard.
" **15** " " .. " **4-8**
18 " **5-0**

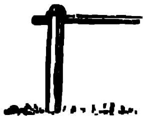
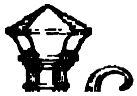
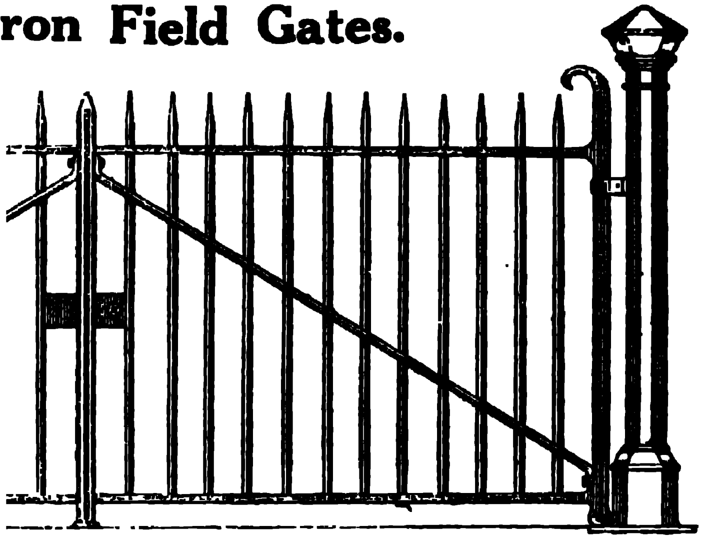


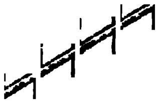
Fig. 49.

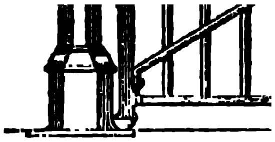
Price, 12 ins. high .. **Rs. 2-8** per yard.
" 18 " **3-0** "

Wrought-Iron Field Gates.



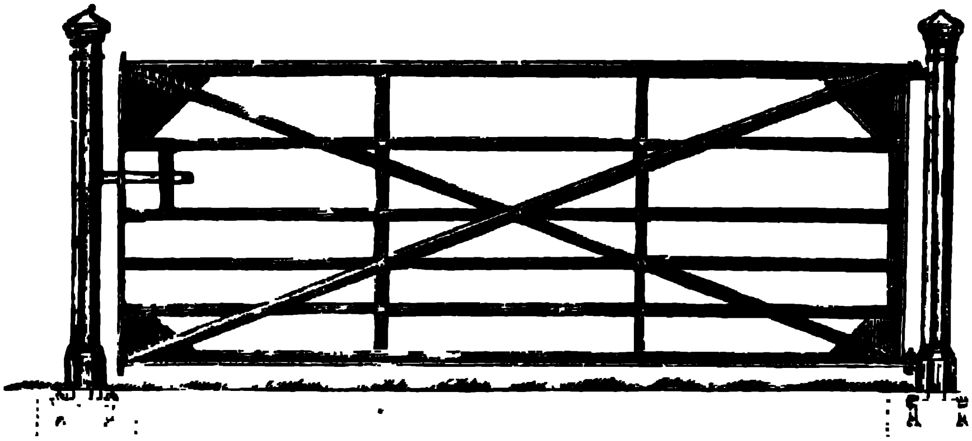






Width.	Height.	Balusters	Price.	Cast-Iron Pillars. Stone.	Cast-Iron Pillars. Self-fixing.
10 ft.	3 ft. 6 ins.	$\frac{1}{2}$ in.	Rs. 160 0	Rs. 55 0	Rs. 65 0
"	4 " 0 "	$\frac{5}{8}$ "	" 170 0	" 60 0	" 70 0
"	4 " 6 "	$\frac{3}{4}$ "	" 180 0	" 65 0	" 75 0
"	5 " 0 "	$\frac{3}{4}$ "	" 200 0	" 70 0	" 80 0
"	5 " 6 "	$\frac{3}{4}$ "	" 210 0	" 75 0	" 85 0
"	6 " 0 "	$\frac{7}{8}$ "	" 220 0	" 80 0	" 90 0

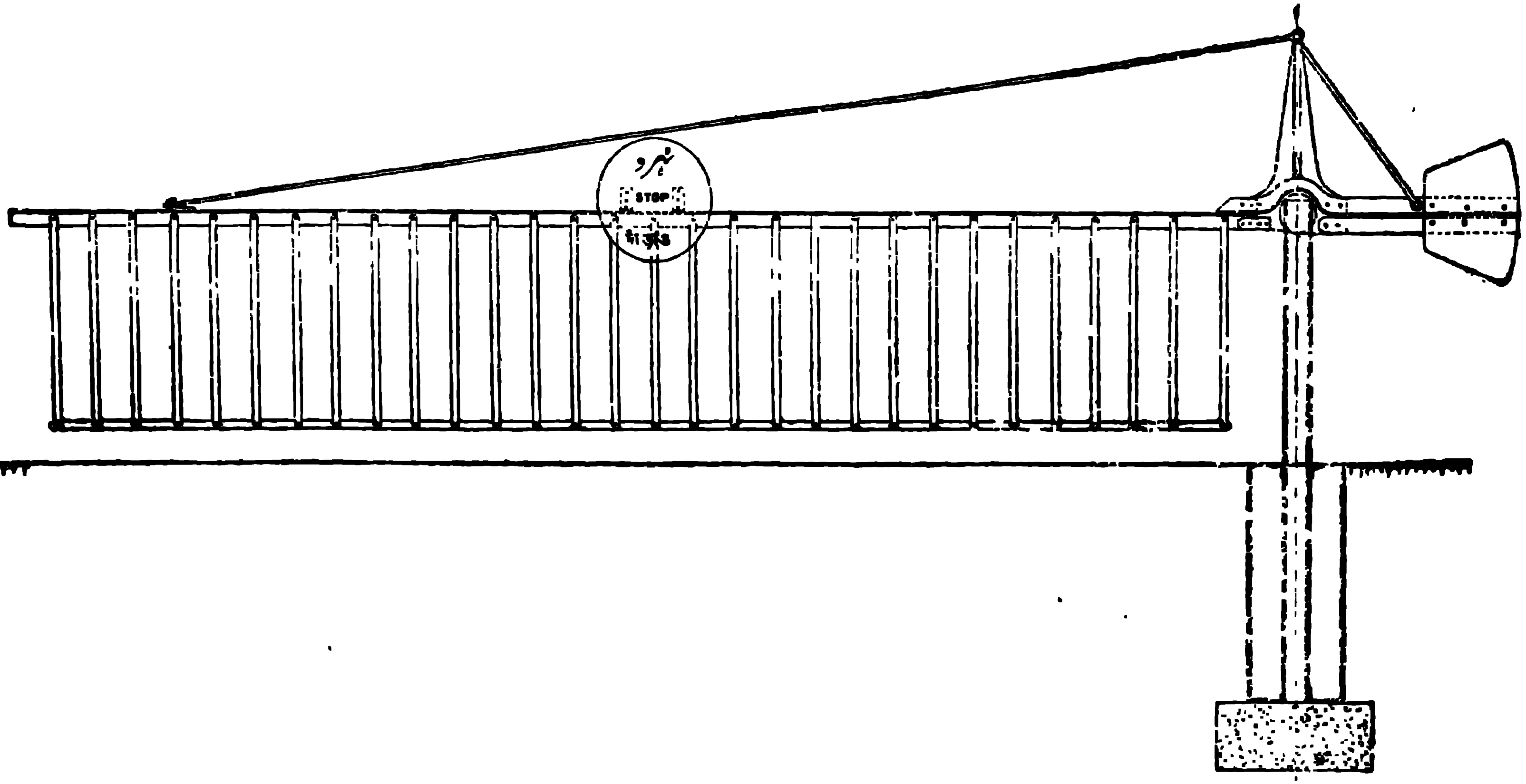
Locks for Gates extra.



This is a very strong design of Gate. The top and bottom Horizontals and Back Bar are of T. Iron, the inner Horizontals and Uprights of Flat Iron, and the Diagonals of Angle Iron; the corners are further strengthened by Plates.

Gate, 9 ft. wide by 4 ft. high, with 4 inner Horizontals, Slip Bolt for Padlock, and Hangings for Wood or Stone	Rs. 75-0
For each additional Horizontal Bar	" 7-0
Gates 10 ft. wide	" 82-0
Cast-iron Pillars for Bolting to Stone or Concrete Base with Bolts ..	" 60-0 pair.
Cast-iron Pillars with self-fixing Base as illustrated above ..	" 75-0 "

Rail-Road Crossing Gate.



We illustrate above a standard design of balanced gate for railway crossings, etc. These are made for any width of road.

Price, of Gate 20 ft. wide, with Post, Balance, Weight, etc. .. .. Rs. **400**
" " " 26 " " " " " " " .. .. " **500**

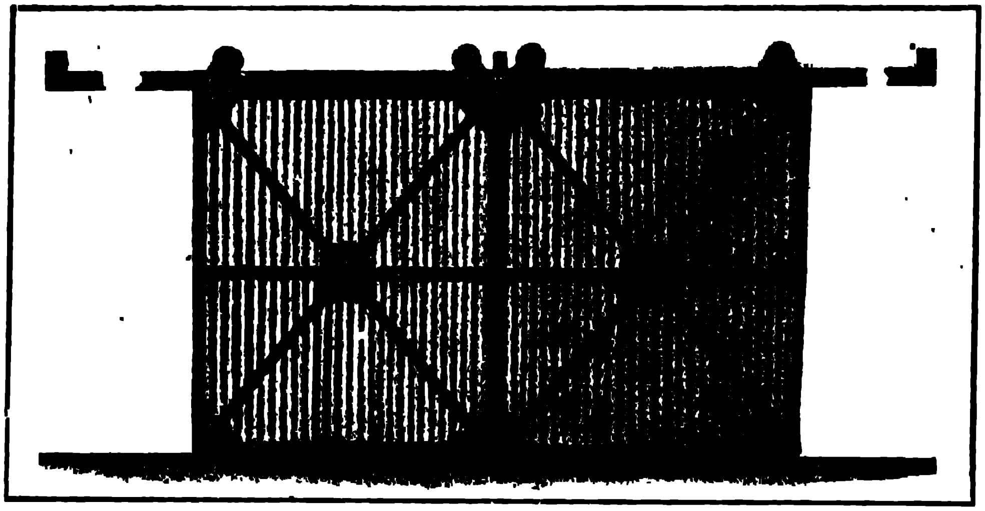
Prices and particulars of other types of gates for crossings on application

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

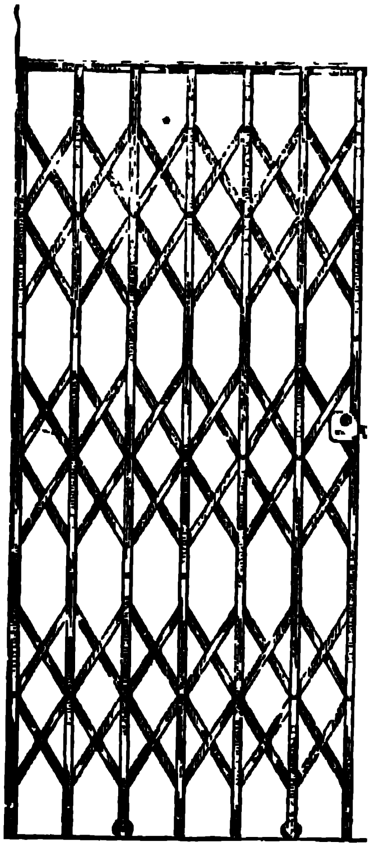
RANGOON, MADRAS,
BOMBAY, LONDON.

Corrugated Iron Sliding Door.



The illustration shows a type of double sliding door suitable for Jute and other Godowns. The doors combine lightness with the necessary stiffness and run on flanged C.-I. wheels which may be fitted with roller bearings, enabling the doors to be opened or closed without undue exertion. A heavier type can be supplied in which steel plates are substituted for the corrugated iron.

Prices on receipt of particulars stating size of opening.



Collapsible Gates.

The illustration depicts a Treble Lattice, Steel Double Leaf Collapsible Gate.

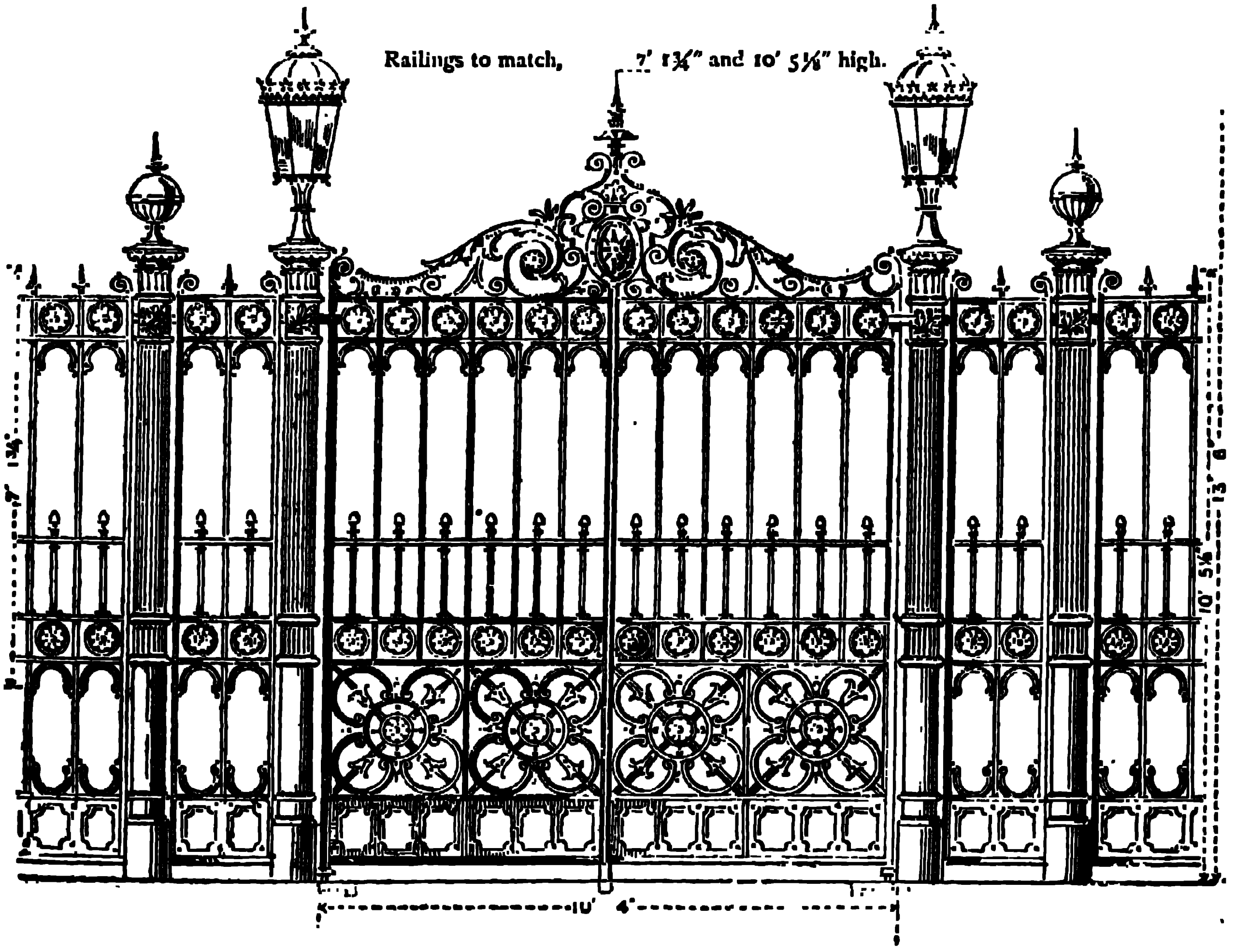
We shall be pleased to quote for either Single or Double Leaf Gates with either Double or Treble Lattice on receipt of the necessary dimensions and particulars.

Full particulars and prices on application.

GRATED DOORS AND WINDOWS.

Prices on application.

Ornamental Cast-Iron Gates.

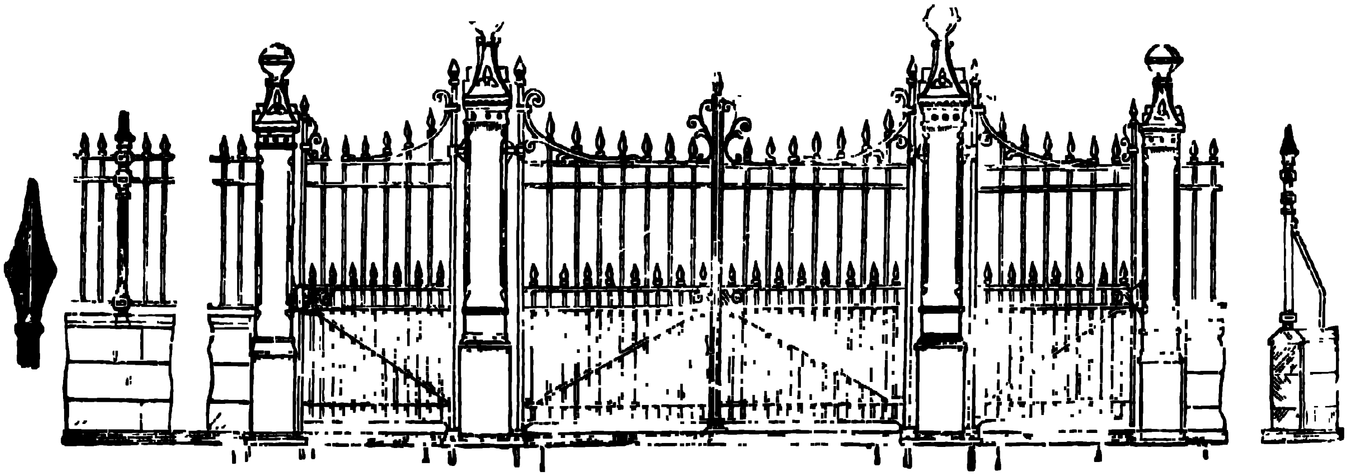


Railings to match, 7' 1¾" and 10' 5⅛" high.

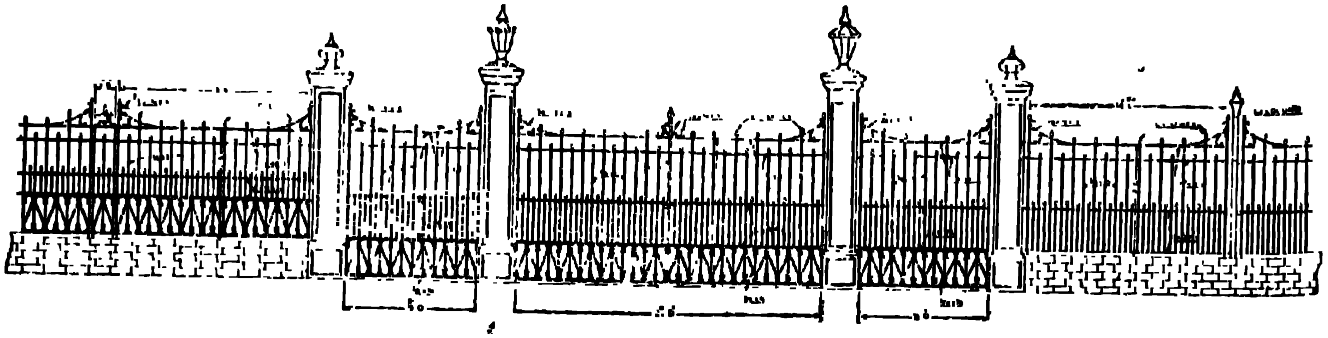
The design of Entrance Gates is of considerable importance as not only must they be strong and afford an effective barrier to intruders but the position they occupy is frequently of great prominence, calling for artistic treatment and consideration of architectural and other features of the surroundings. It is impossible to give in these pages a great variety of designs and patterns of ornamental Gates, and we shall be glad to furnish sketches to our constituents on receiving the necessary particulars and an indication of the style required

Other Designs and Particulars on application.

Ornamental Cast-Iron Gates.



The above illustrates a pair of gates 10 feet wide 7 feet high from ground at centre of each leaf. Vertical Bars ¾ inch square, fitted with best brasswarded lock and sham and hangings for stone pillars.



The above is a composite drawing showing general styles of wrought-iron works for gates and railings. Different combination of similar designs can be made.

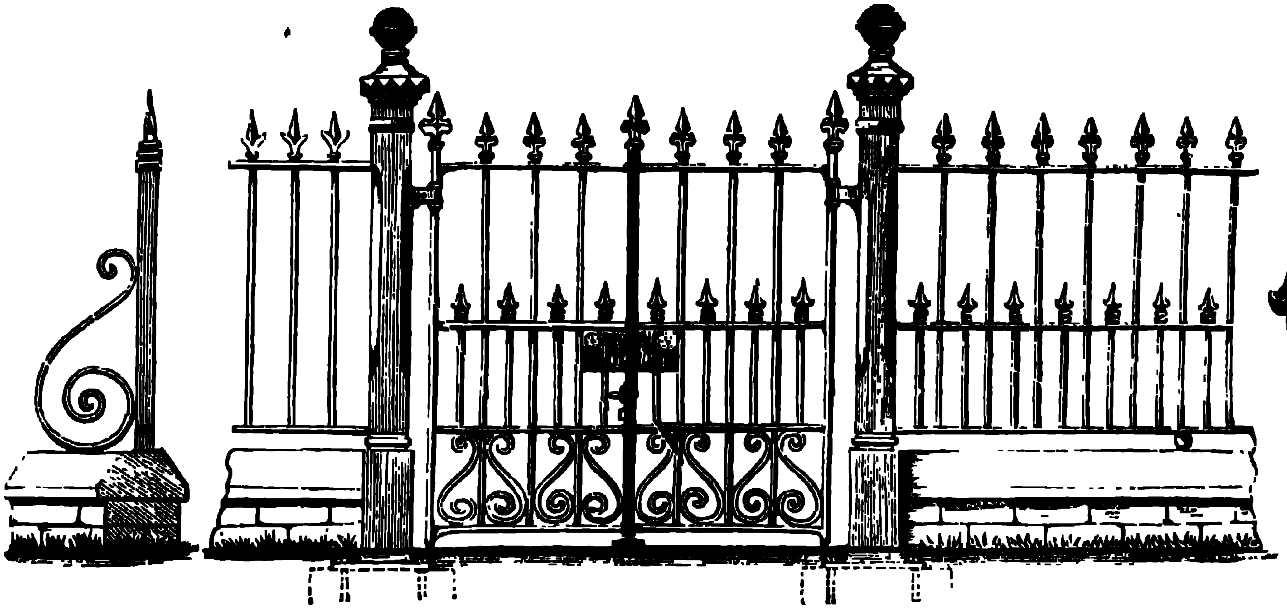
Specification and Estimates on application.

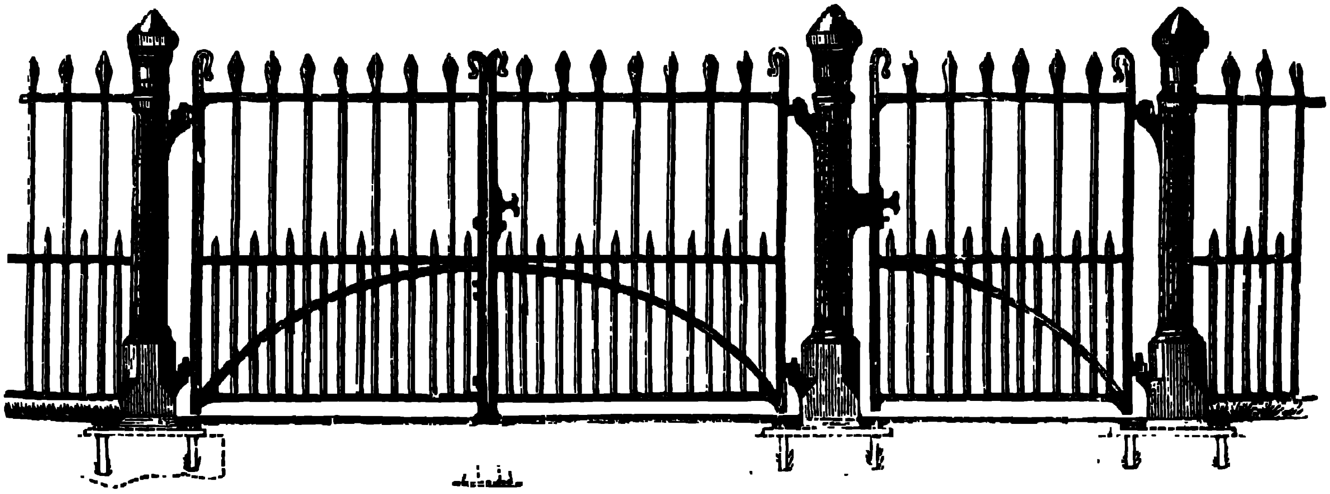
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

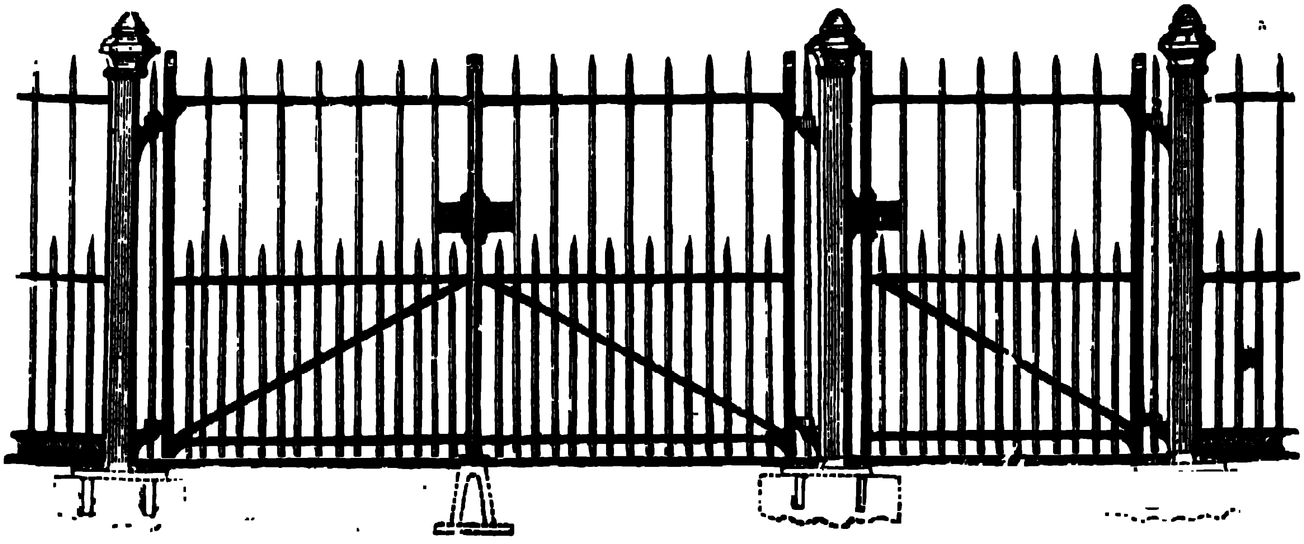
JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Wrought-Iron Ornamental Gates and Railings.

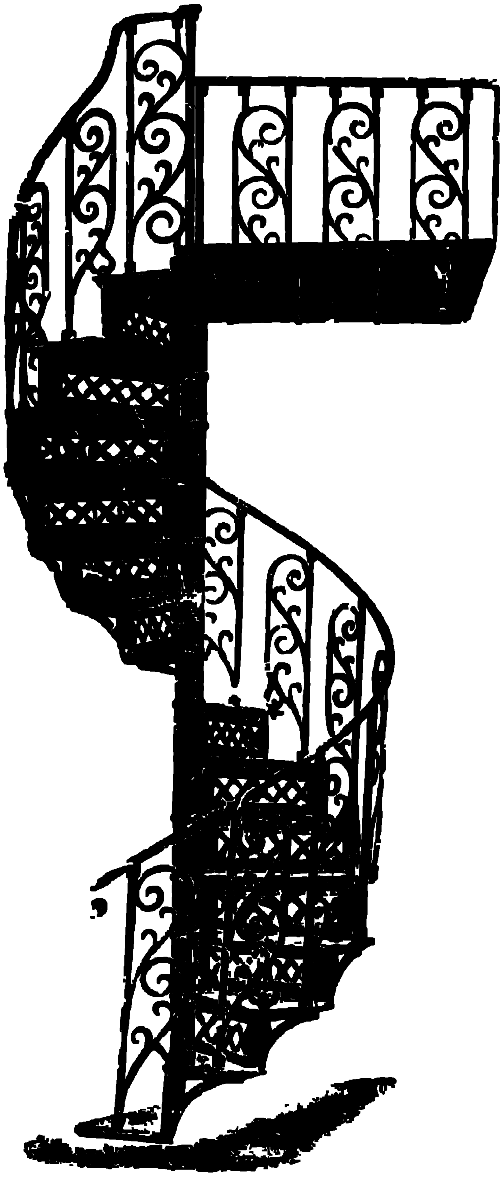


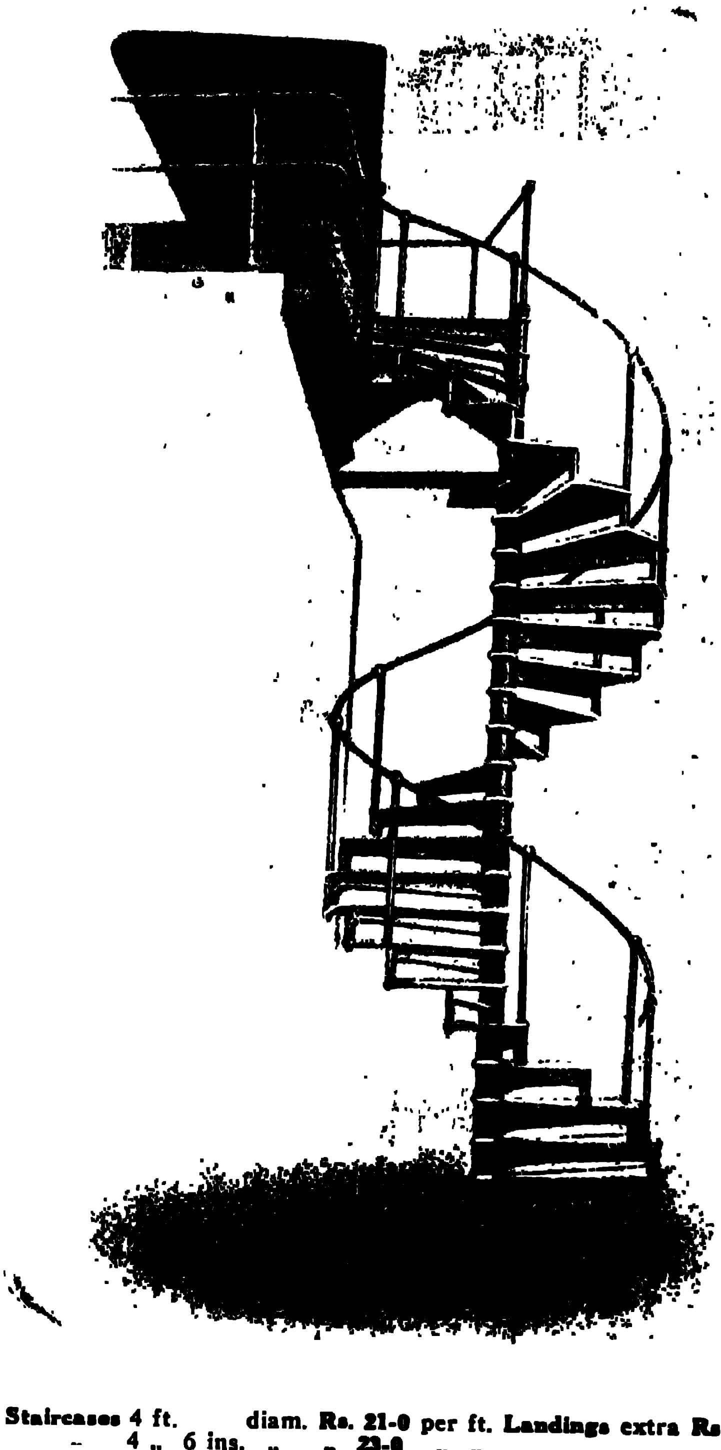




Other Designs and Particulars on application.

Ornamental Spiral Staircases.





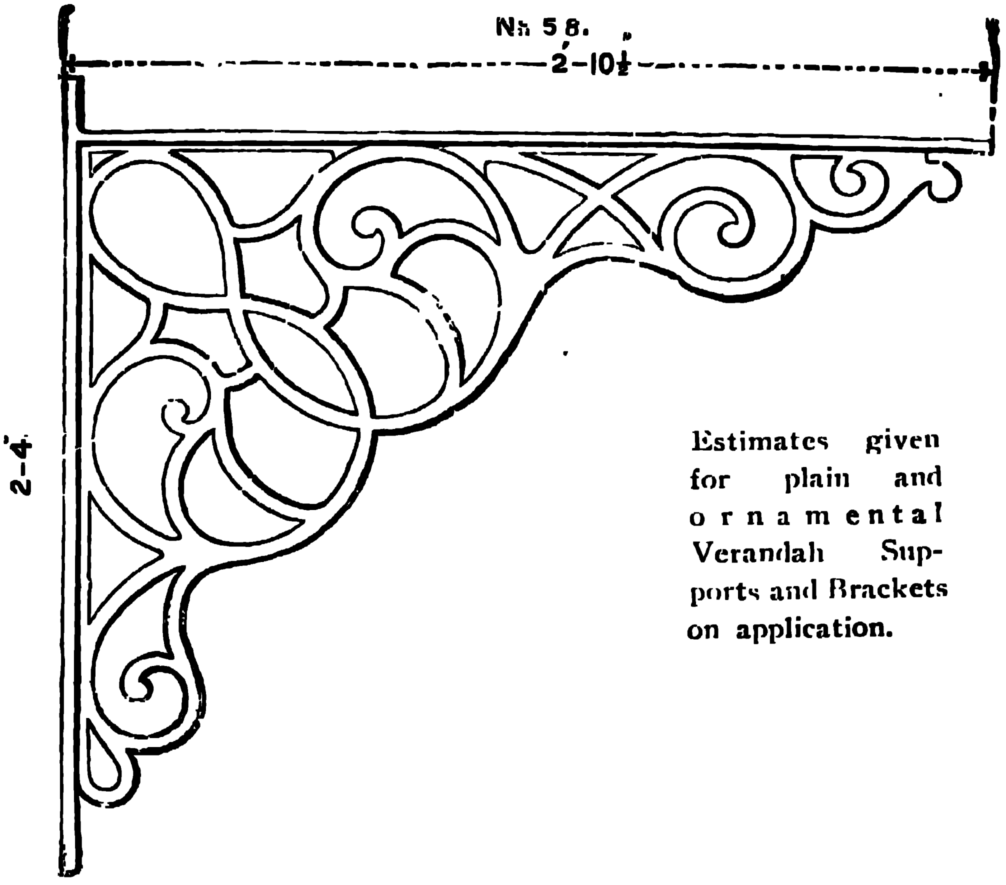
Modifications of the balcony railings shown on the following pages may be used if desired.

The above illustrations show two of the several types of ornamental Staircases made by us.

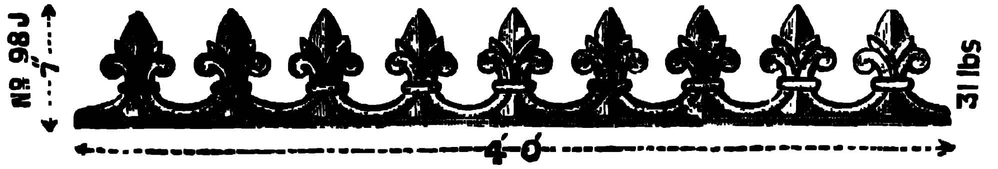
Staircases 4 ft.	diam.	Rs. 21-0	per ft.	Landings extra	Rs. 28-
4 „ 6 ins.	„	„ 23-0	„ „	„ „	„ 28-
5 „	„	„ 26-0	„ „	„	„ 30-
5 „ 6 „	„	„ 32-0	„ „	„	„
6 „	„	„ 48-0	„ „	„	72-

Ornamental Staircases 50 per cent. extra.

Verandah Supports.



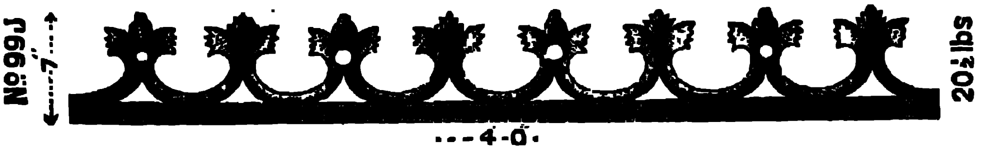
Estimates given for plain and ornamental Verandah Supports and Brackets on application.



33 lbs.

Crestings.

The weights given are approximate and may vary.

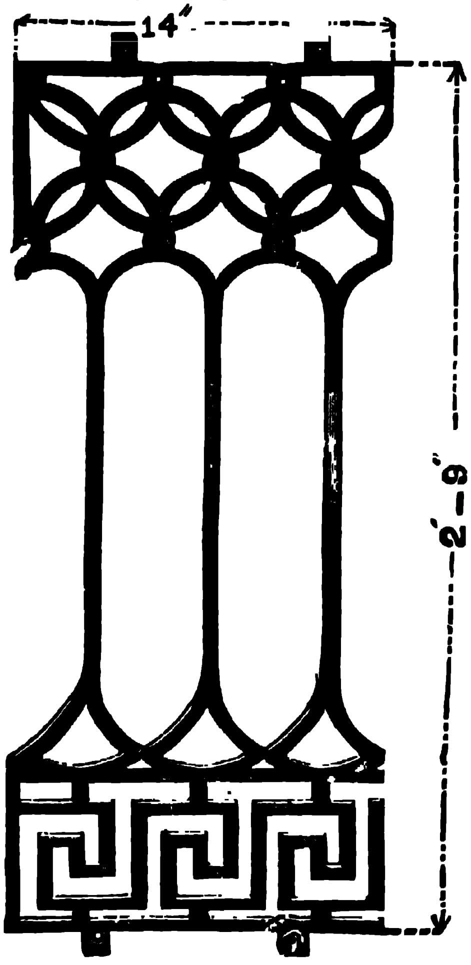


22 lbs.

Prices on application.

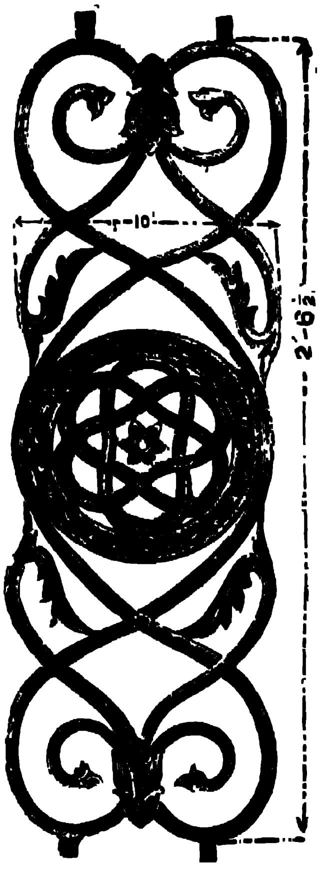
Balcony and Staircase Railings.

Nº63



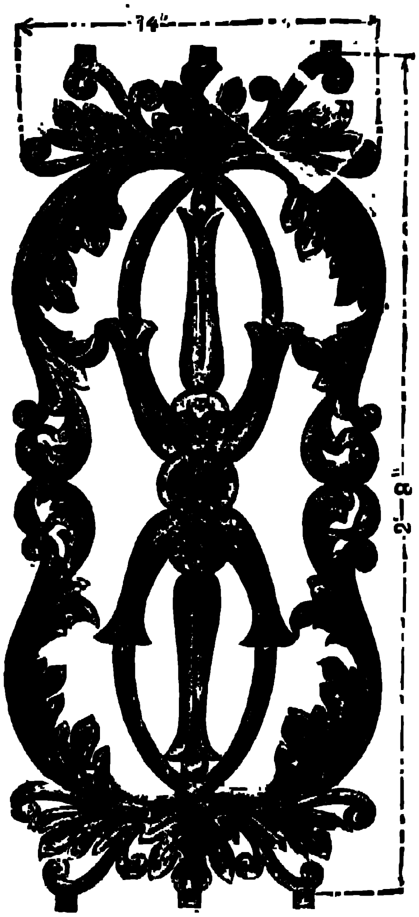
32 lbs.

Nº84

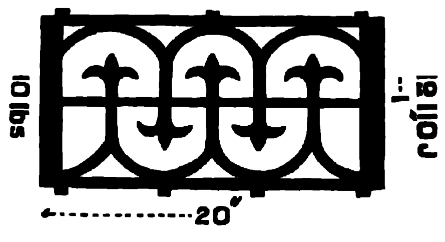


27 lbs.

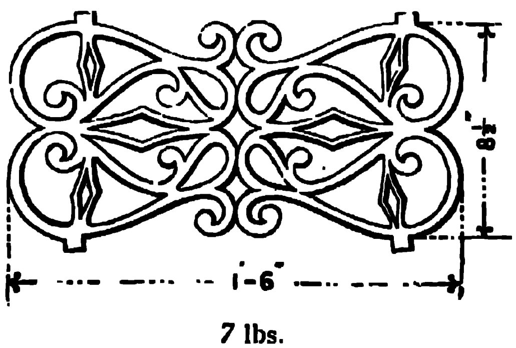
Nº65



37 lbs.



Nº38.



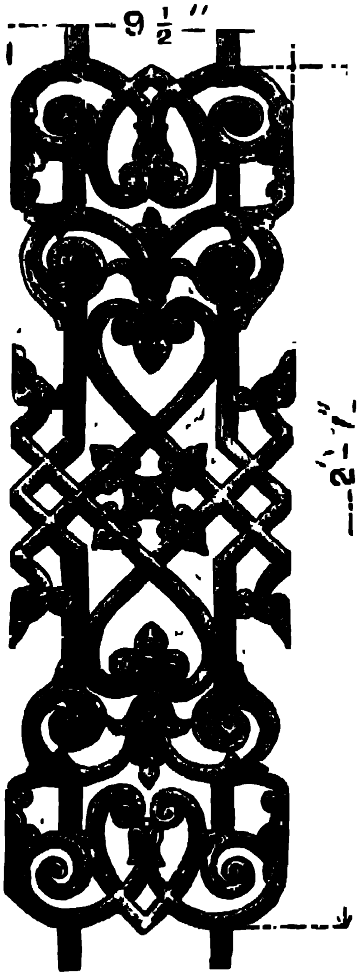
7 lbs.

The weights given are approximate and may vary.

Approximate Price, Rs. 21-0 per cwt.

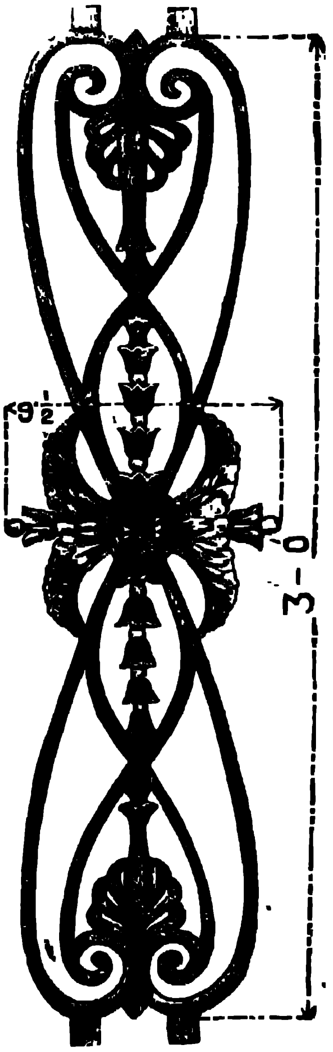
Balcony and Staircase Railings.

No 67



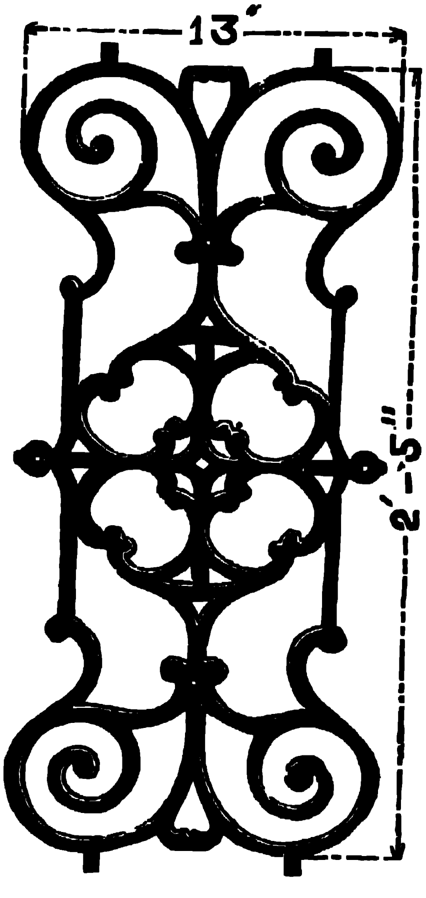
21 lbs.

No 68



23 lbs.

No 70



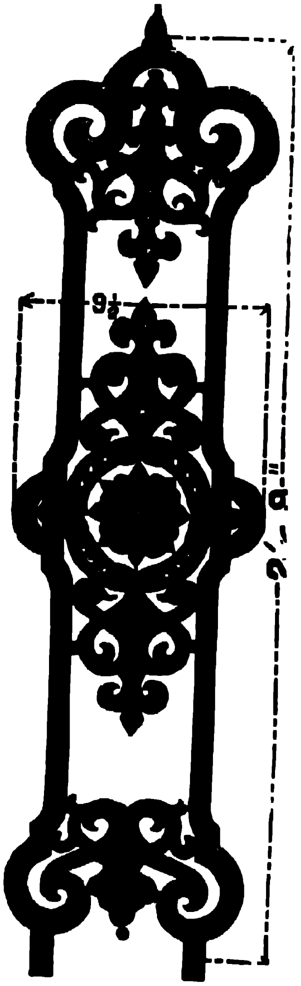
23 lbs.

The weights given are approximate and may vary.

Approximate Price, Rs. 21-0 per cwt.

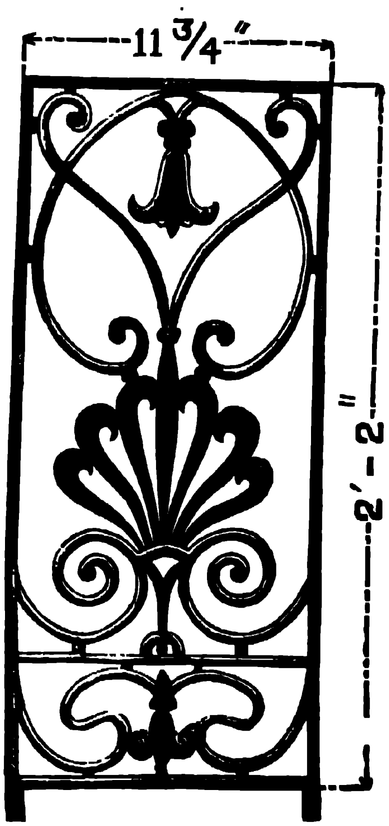
Balcony and Staircase Railings.

No. 71



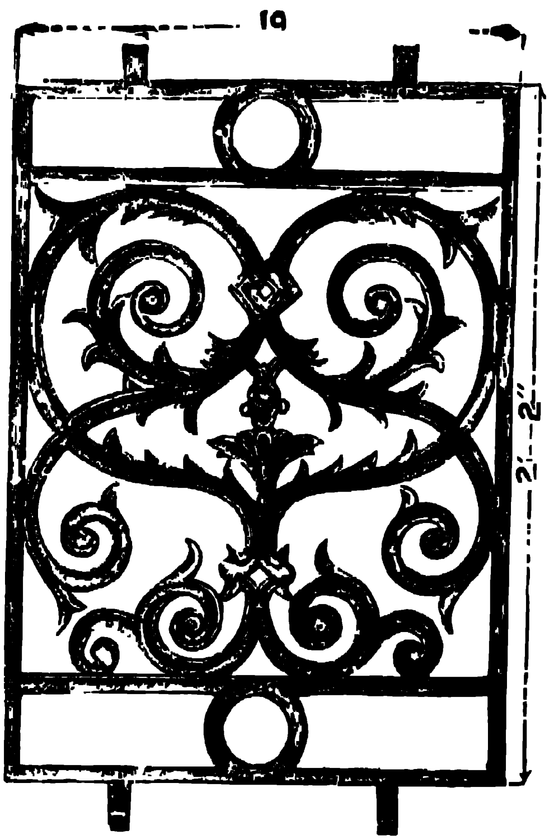
35 lbs

No. 72



22 lbs.

No. 73



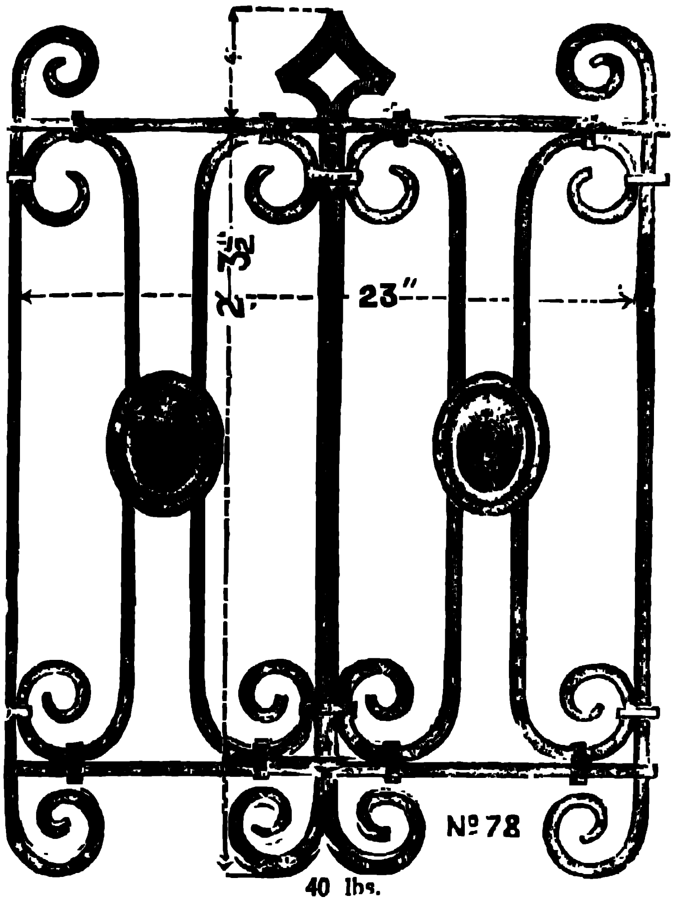
38 lbs.

The weights given are approximate and may vary.

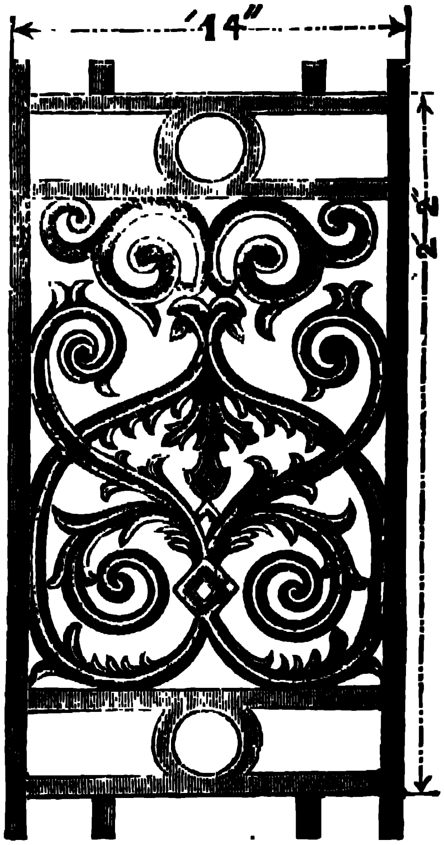
Approximate Price, Rs. 21-0 per cwt.

Balcony and Staircase Railings.

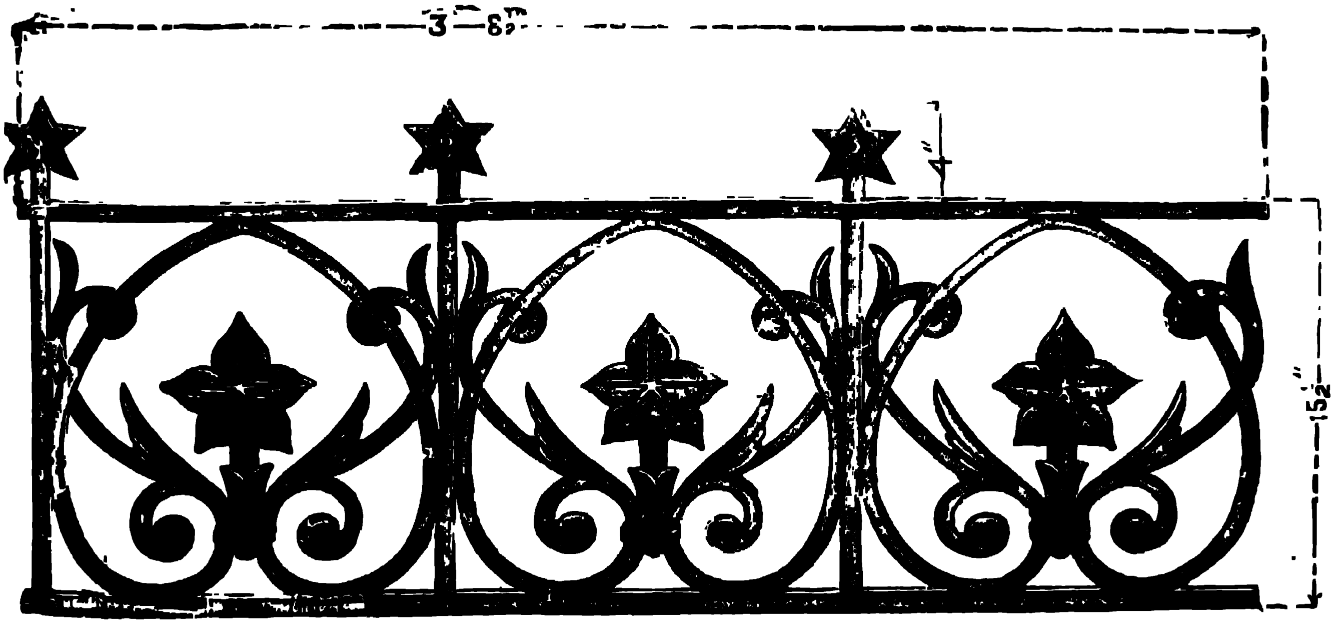
No. 74



40 lbs.



36 lbs.



61 lbs.

The weights given are approximate and may vary.

Approximate Price, Rs. 21-0 per cwt.

Balcony and Staircase Railings.

No 84

No 87

No 81

No 86

5½"

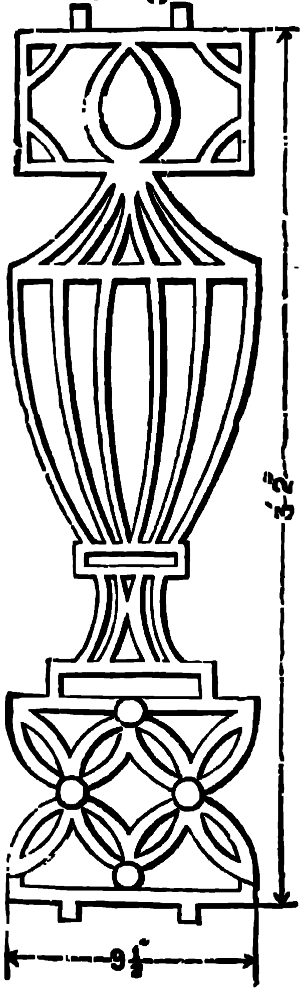
No 81	No 84	No 86	No 87	
10 lbs.	18 lbs.	7 lbs.	13 lbs.	11 lbs.

The weights given are approximate and may vary.

Approximate Price, Rs. 21-0 per cwt.

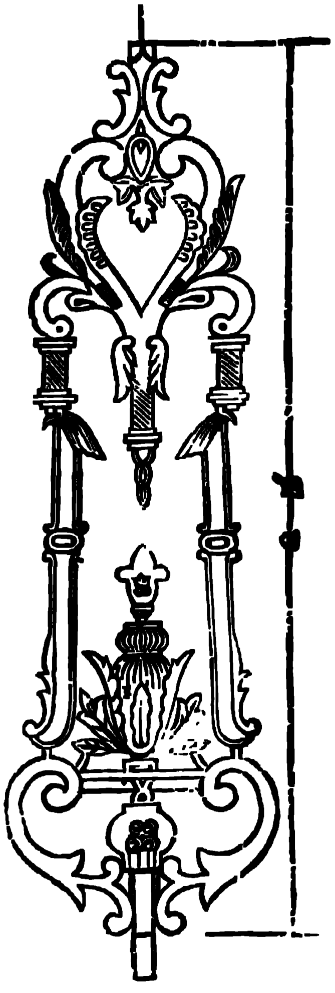
Balcony and Staircase Railings.

No. 25



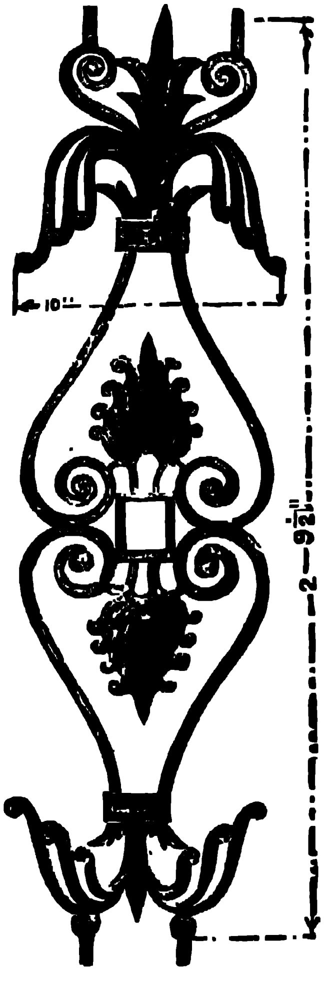
22 lbs.

No. 16



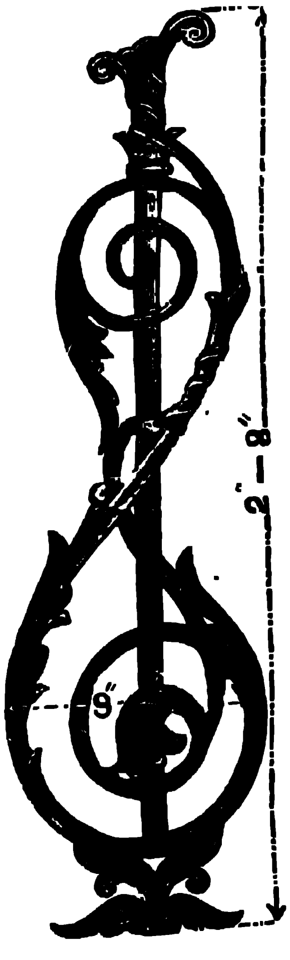
23 lbs.

No. 66



20 lbs.

No. 80



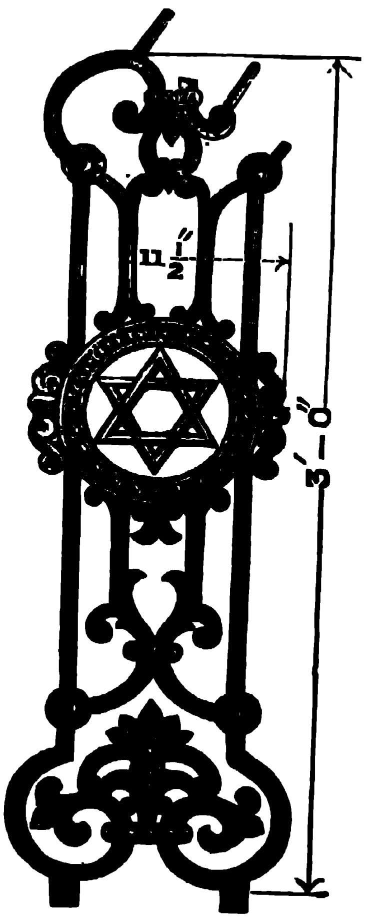
22 lbs.

The weights given are approximate and may vary.

Approximate Price, Rs. 21-0 per cwt.

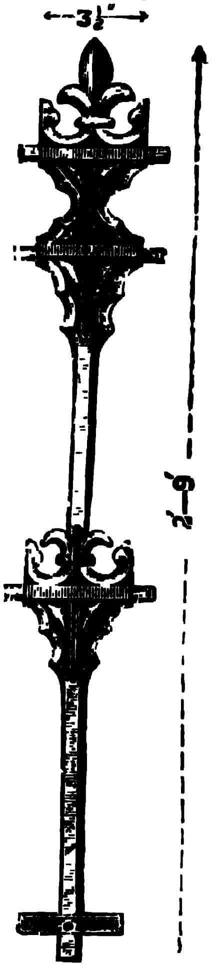
Balcony and Staircase Railings.

No 88



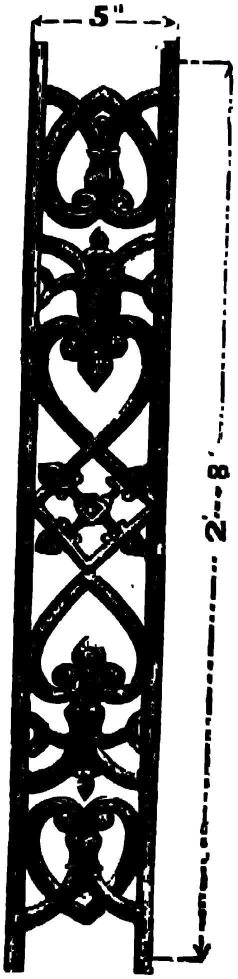
33 lbs.

No 102J



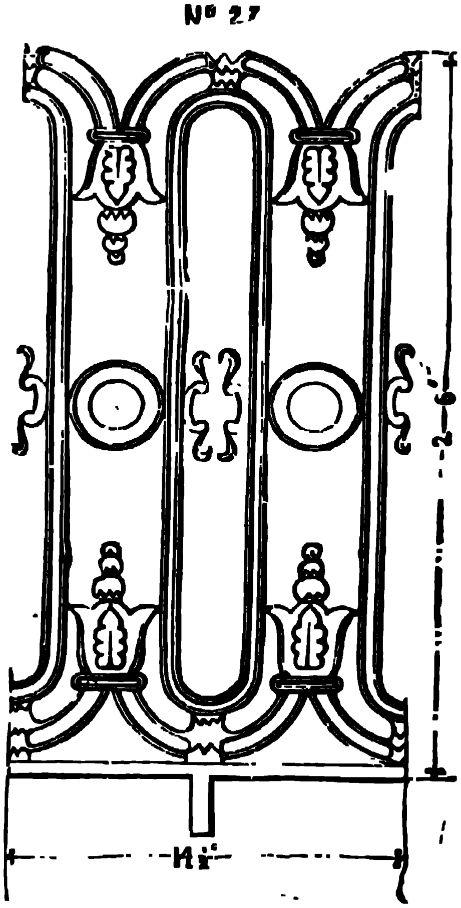
11 lbs.

No 77



16 lbs.

No 27

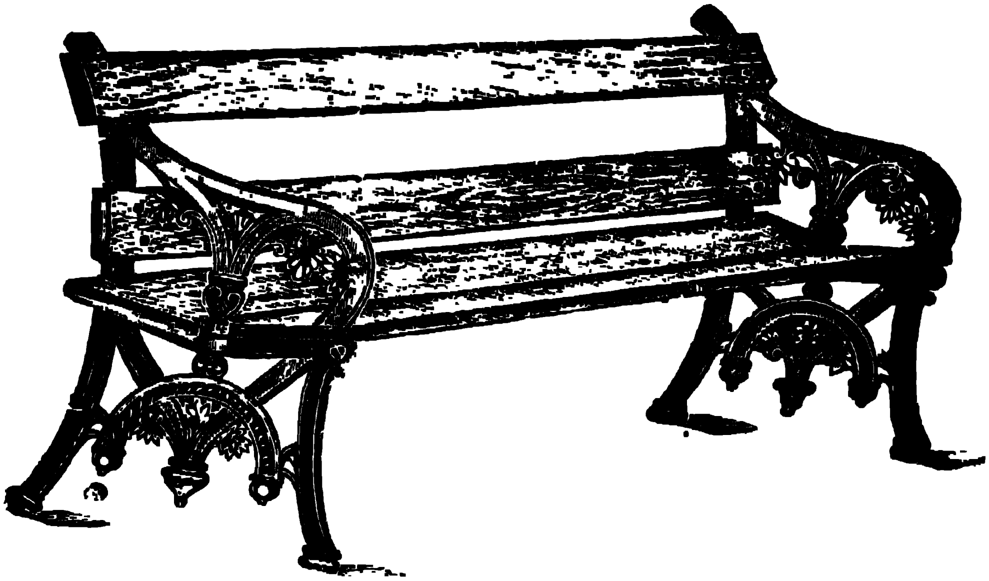


27 lbs.

The weights given are approximate and may vary.

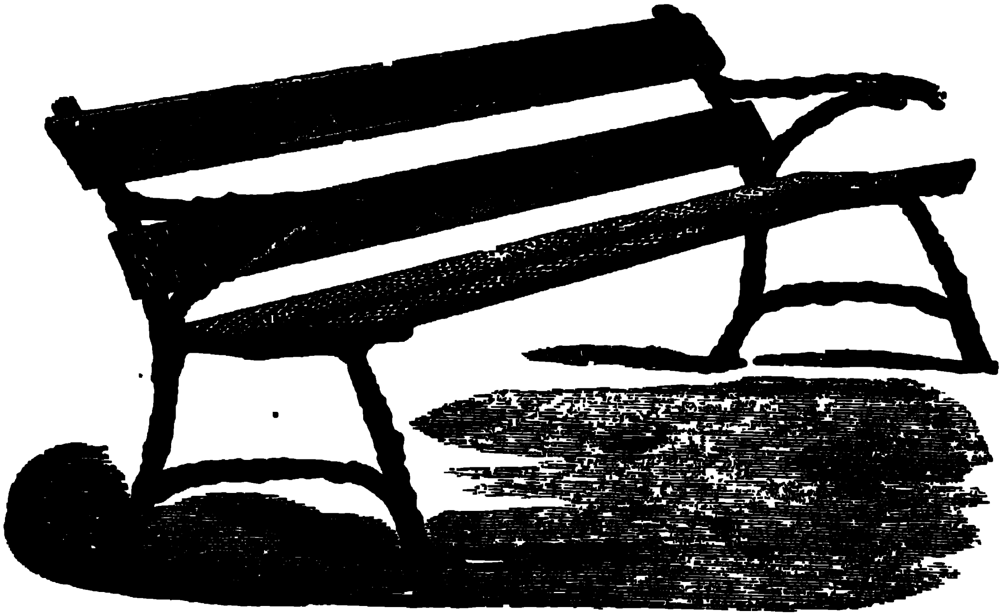
Approximate Price, Rs. 21-0 per cwt.

Platform Benches and Ornamental Garden Seats.



No. 1.

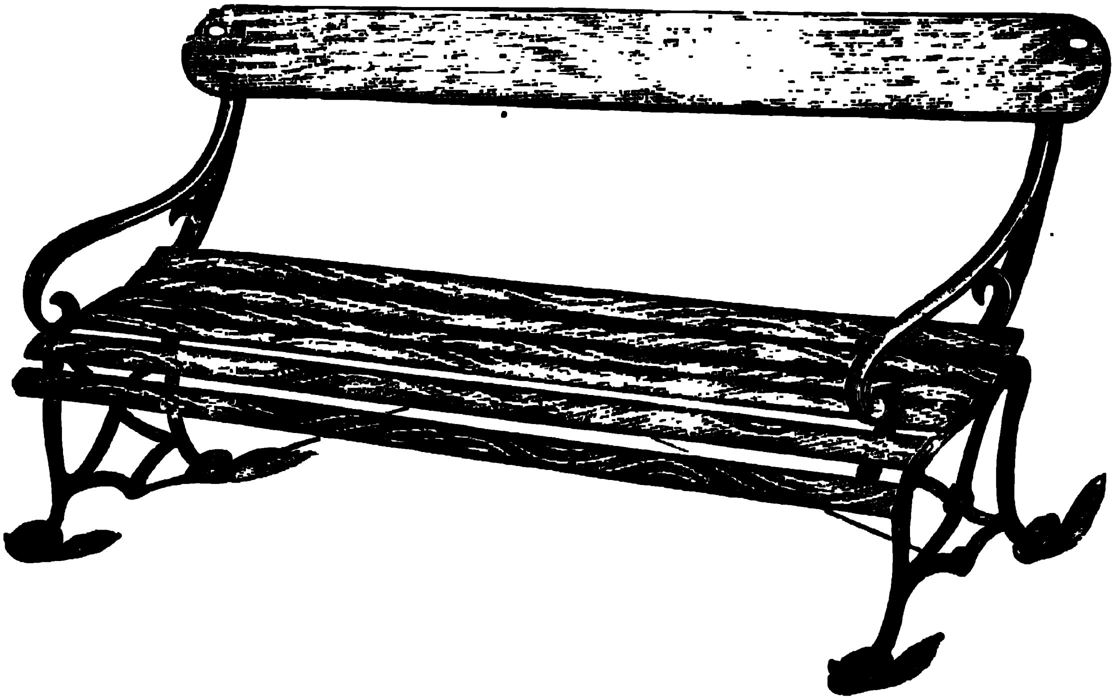
Price, Rs. 60-0 each.



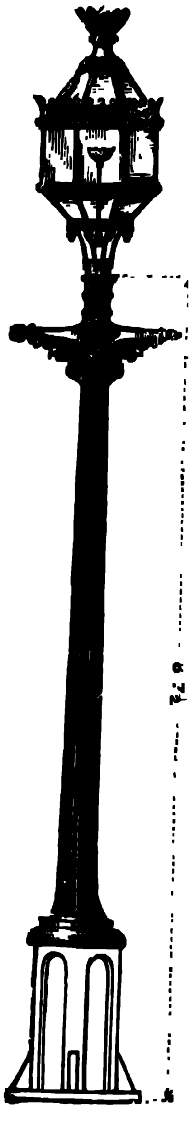
No. 2.

Price, Rs. 55-0 each.

Platform Benches and Ornamental Garden Seats.



No. 3. Price, Rs. 60-0 each.

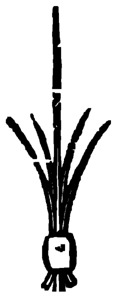


Lamp Posts.

Lamp Posts as illustrated.

Price, Rs. 125-0

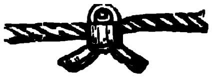
Lightning Conductors.



We would draw the attention of those living on exposed sites in stormy districts to the necessity of protecting all buildings by means of properly constructed Lightning Conductors; and it has been frequently proved that an inefficient Lightning Conductor does not only serve no purpose, but is in reality a source of danger during thunderstorms.

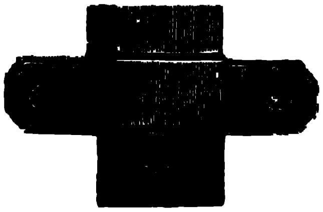
The following is a short summary of what is recommended to be carefully considered in the construction of Lightning Conductors:—

1. That there is good continuous conduction.
2. That the points of the copper Elevation Rod are raised at least three feet above the highest part of the building, and are not subject to corrosion.
3. That there is ample earth contact with plates or coils, buried at a sufficient depth, depending on the nature of the soil, so as to assist the current in passing into the earth.
4. That no portion of the building outside the limit of the conductor is without a point connected to the conductor.



5. That all external masses of metal, ventilators, pipes, etc., should be connected to the nearest conductor.

Lightning Conductor Fittings.



Copper Tape.

1½ ins. by ⅛ in.

Price, Rs. 1-8 per foot.

Copper Clips & Nails.

Suitable for 1½ ins. by ⅛ in. Tape.

Clips.

Price, Rs. 4-0 per doz.

Nails.

Price, Rs. 2-4 per doz.

5-point Copper Terminals or Elevation Rods .. **Price, Rs. 51-0 each.**

If details of any buildings are furnished, we shall be pleased to submit plans and estimates for the protection of same.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Spigot and Socket Glazed Stoneware Pipes and Connections.

Of Best British Manufacture.

Prices and Standard dimensions of ordinary Pipes.

Internal diam. .. Ins.	4	5	6	7	8	9	10	12	15
Length of Barrel .. Ins.	24	24	24	30	30	30	30	30	30
External diam .. „	5	6⅛	7¼	8⅜	9¾	10½	11⅞	14	17½
Thickness of Barrel .. „	½	9/16	⅝	11/16	11/16	¾	13/16	1	1¼
Approximate weight .. lbs.	18	24	28	38	41	50	60	82	125
Price, per foot .. **Rs.**	1 2	1 8	1 12	2 6	2 10	3 0	3 14	5 0	8 4

Prices for other sizes on application.

Junctions.

Not more than 2 feet long.

Internal diam. .. Ins.	4	5	6	7	8	9	10	12	15
SINGLE **Price,** each **Rs.**	4 8	6 0	7 0	9 8	10 8	12 0	15 8	20 0	33 0
SINGLE CURVED **Price,** each **Rs.**	5 10	7 8	8 12	11 14	13 2	15 0	19 6	25 0	41 4
DOUBLE OR BREECHES **Price,** each **Rs.**	6 12	9 0	10 8	14 4	15 12	18 0	23 4	30 0	49 8
DOUBLE CURVED **Price,** each **Rs.**	9 0	12 0	14 0	19 0	21 0	24 0	31 0	40 0	66 0

Prices for other sizes on application.

Bends and Tapers.

Internal diam. .. Ins.	4	5	6	7	8	9	10	12	15
BENDS, including **KNUCKLES** **Price,** each **Rs.**	3 6	4 8	5 4	7 2	7 14	9 0	11 10	15 0	24 12
JUNCTION and TAPER BENDS **Price,** each **Rs.**	5 10	7 8	8 12	11 14	13 2	15 0	19 6	25 0	41 4
REST BENDS **Price,** each **Rs.**	6 12	9 0	10 8	14 4	15 12	18 0	23 4	30 0	49 8
INSPECTION BENDS **Price,** each **Rs.**	6 12	9 0	10 8	14 4	15 12	18 0	23 4	30 0	49 8
ACCESS BENDS **Price,** each **Rs.**	10 2	13 8	15 12	21 6	23 10	27 0	34 14	45 0	74 4
CHANNEL BENDS **Price,** each **Rs.**	2 9	3 6	4 0	5 6	6 2	6 12	8 12	11 4	18 9
ORDINARY SINGLE TAPERS **Price,** each **Rs.**	4 8	6 0	7 0	9 8	10 8	12 0	15 8	20 0	33 0

Prices for other connections on application.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

"Rok" Roofing.

The most permanent roofing on the market.

Made by

D. Anderson & Son, Ltd., Manchester and London.

"Rok" Roofing

is the result of the makers' 70 years' experience in the Felt trade. They were supplying Roofing Felt to the British War Office during the Crimean War, and can, therefore, talk about Roofing Felt with authority.

"ROK" has withstood the severest tests in India and other tropical countries, and, as a result, we can confidently assert it is the **most permanent roofing. This we are prepared to guarantee.**

"ROK" is composed of a strong and carefully prepared sheet of Fibre saturated with an elastic waterproofing compound, which does not dry out or evaporate in any climate, as it contains no oils or volatile matter, and coated on the surface with a permanent composition of natural bitumens of very high melting point.

There is nothing of an organic nature in either the saturating or coating compound.

"ROK" is acid and alkali proof. White Ants won't attack it.

Rain water from roofs covered with it can be used for domestic purposes.

Being an excellent non-conductor it ensures an even temperature, and is, therefore, an ideal roofing for hot climates.

"ROK" is suitable for either Pitched, Flat, or Circular ("Belfast") Roofs.

"ROK" is eminently suitable for waterproofing reinforced Concrete Roofs, and w supplied it largely for this purpose.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"ROK" Roofing is made in 4 thicknesses. Each roll measures 72 ft. by 3 ft., equal to 216 square feet, so as to cover 200 square feet, allowing for overlaps.

The average weights per roll are as follows:

½-ply 50 lbs.	1-ply 62 lbs.	2-ply 82 lbs.	3-ply 104 lbs.

These are the **net weights** of the rolls, and do not include nails, cement, nor wrapper.

With each roll we send out 2¾ lbs. of nails and 1⅛ pints of **"ROK"** Liquid Cement for jointing the laps.

We recommend:—

½-ply for sarking or lining purposes, and temporary work.
1-ply for Buildings where a light but permanent roof is required.
2-ply for Permanent Buildings, Bungalows, Factories, etc.
3-ply for places where the roof is exposed to severe climatic conditions or chemical fumes and gases.

Prices of "ROK" per roll.

½-ply with sufficient nails, and liquid cement for joints, for wooden roofs.	**Rs. 19-0** per roll
1-ply with sufficient nails, and liquid cement for joints, for wooden roofs.	**Rs. 22-8** per roll.
2-ply with sufficient nails, and liquid cement for joints, for wooden roofs.	**Rs. 27-4** per roll.
3-ply with sufficient nails, and liquid cement for joints, for wooden roofs.	**Rs. 35-0** per roll.

Note—If Hard **"ROK"** Mastic required for laying **"ROK"** on concrete Roofs, add **Rs. 9-12** per roll to above prices.

Asphalte Saturated Felt for underlays.

Thin	.. **Rs. 11-0** per roll.
Thick	.. „ **16-0** .. ..

This felt is put up in rolls of the same size as **"ROK."**

Please write for samples and fully descriptive literature.

LAYING.—We undertake the laying of "ROK" in any part of the country, and shall be very pleased to furnish estimates for this work, on request.

"Siderosthen" Anti-Corrosive Solution.

Made by D. Anderson & Son, Ltd., Manchester and London.

Rust is ruthless. It spares neither bolt nor bridge. All unprotected Iron, Steel and Zinc work are the prey of insidious corrosion. Every year it eats up millions of pounds worth of metal.

Combat bad with the best. Apply "Siderosthen" Anti-Corrosive Paint to all metal which is liable to corrode.

"Siderosthen" has been on the market nearly 30 years. Its increasingly extensive use throughout the world by leading firms proves that competitive prices compatible with the high quality of the product is the policy that pays—both the buyer and the Manufacturer.

"Siderosthen" resists the actions of Chlorine, Ammonia, Nitric, Acetic, Sulphuric and Muriatic fumes.

"Siderosthen" is also an excellent paint for woodwork. Two coats applied to smooth-surfaced timber will give it a glossy protective covering.

Tests have proved that timber treated with "Siderosthen" will withstand the attacks of White Ants. "Siderosthen" will not blister under great heat and therefore is particularly suited for use in the Tropics.

The covering capacities of the various colours of "Siderosthen" are as follows:—

Black and Chocolate	600	square yds.	to cwt.
Red	500	„	„
Grey	400	„	„
White	400	„	„
Stone	400	„	„
Green	400	„	„

Use it for

All Steelwork.—Bridges, Buildings, Tanks, Chimneys, Ships' holds, bunkers, etc.

Water Mains.—Several of the largest British Corporation Water Departments are using "Siderosthen" for coating their pipes both inside and out, and it has been adopted for coating the Mains for some of the most recent and largest contracts in the World.

Prices, packed in ½ cwt. drums:

Black	Rs.	47-4	per	cwt.
Chocolate	„	47-4	„	„
Red	„	62-4	„	„
Stone	„	62-4	„	„
Grey	„	68-12	„	
Green	„	73-4	„	„
White	„	77-0.	„	

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Stoneferry" Sack Marking Composition.

For Jute or Hessian Sacks.

"Stoneferry" Composition has been supplied for over 40 years to the chief centres of the Jute Trade.

The quality now being made is the outcome of experience gained in meeting the special needs of the trade. Constant improvements enable the Makers to offer a Composition proved to be effective and economical.

"STONEFERRY."

Gives a clear impression.

Does not clog the type.

Gives the maximum number of impressions at minimum cost.

This composition is easy working and reliable. It is detrimental to neither type or rollers, and can be employed for all methods of Sack branding.

Prices:

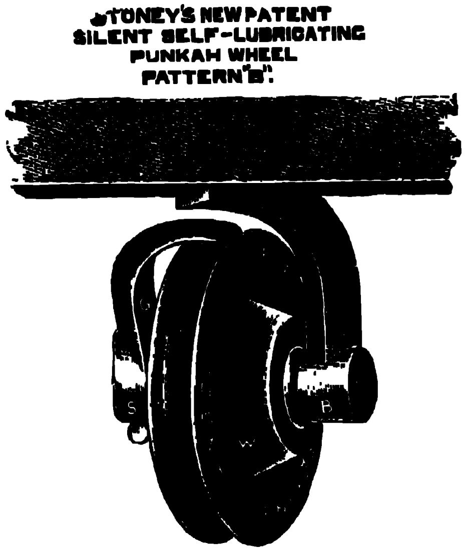
Super Black	. . **Rs. 39-8**	per cwt.
Light Cutch Brown	. . „ **40-0**	„ „
Bright Red	. . „ **49-8**	„ „
Crimson	. . „ **49-8**	„ „
Bright Green	. . „ **53-0**	„ „
Ultramarine Blue	. . „ **57-0**	„ „

Packed in drums containing 1 cwt. nett.

The above colours are kept in stock in Calcutta, but quick shipment can be obtained of other colours if required.

Samples sent on request.

Stoney's New Patent Self-Lubricating Punkha Wheels.



Pattern B.

This pattern of Wheel has been designed and constructed with such modifications as to reduce the cost of manufacture without in any way modifying the working valve. They are fixed vertically as shown in the illustration, and are self-oiling and perfectly silent.

Size, 4½ inches .. .. **Rs. 9-0** each.

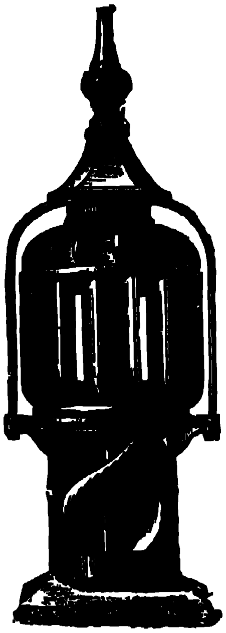
Brass Punkha Wheels.	Ins.	4	5	6	
	Rs.	**5-8**	**6-8**	**10-0**	each.

Cast-Iron Punkha Wheels, with Gas Pipe and Screwed Washer .. .. **Rs. 15-0** each.

Buckets.

Galvanized Iron, Riveted Sides and Bottoms.

Size	Ins.	12	14
Per dozen ..	**Rs.**	**23 12 0**	**26 4 0**



Patent Archimedian Ventilator.

Revolves on carefully turned Spindle working on two centres and is not liable to become fixed and fail to rotate.

The Screw is made of Zinc and will not rust.

The Ventilator is ornamental, pleasing in appearance and easily fixed in position.

Price, Rs. 66-0 each.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Screws, Pins and Nails.

Iron Wood Screws.

Countersunk Heads.

Price per Gross

Ins.	¼, ⅜, ½	¾	1	1¼	1½	1¾	2	2½	3	3½	4
No. 4.... Rs.	0 6 3	0 7 6	0 9 0	..	.	.	..	..	..	..	..
„ 5 „	0 6 6	0 8 0	0 9 6	0 11 6	..	.	..	..	..	.	..
„ 6 „	0 7 0	0 8 9	0 10 0	0 11 9	0 13 3	..	.	..	..	..	..
„ 8 „	0 8 9	0 9 9	0 11 0	0 13 0	0 14 6	1 0 9	1 2 0	..	..	..	..
„ 9 „	0 9 6	0 10 6	0 11 6	0 13 9	0 15 0	1 1 3	1 2 6	..	..	..	..
„ 10 „	0 10 3	0 11 0	0 12 3	0 14 6	0 15 6	1 2 0	1 4 0	1 8 0	..	..	..
„ 12 „	0 11 9	0 13 0	0 14 6	1 1 0	1 2 6	1 6 0	1 8 0	1 14 0	2 4 0	..	.
„ 14 „	..	..	..	..	1 7 6	1 11 0	1 14 0	2 4 0	2 10 0	3 4 0	..
„ 16 „	..	..		.	1 14 0	2 0 0	2 4 0	2 10 0	3 4 0	4 0 0	4 6 9
„ 18 „	..	..	.	.	2 3 0	2 6 9	2 10 0	3 0 0	3 15 6	4 15 0	5 6 0
„ 20 „	..	..	..	.	2 10 0	2 13 0	3 1 0	3 8 0	4 12 0	5 14 0	6 4 6
„ 22 „	..	.	..	..	3 0 0	3 4 0	3 9 6	4 0 6	5 8 9	6 12 0	7 2 0
„ 24 „	..	..	..	..	3 6 0	3 11 0	3 15 0	4 12 0	6 8 0	7 9 0	7 14 0

Prices for larger sizes and Round Head Screws on application.

Brass Wood Screws.

Countersunk Heads.

Price per Gross.

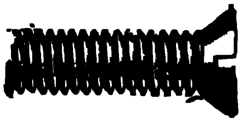
Ins.	¼, ⅜, ½	¾	1	1¼	1½	1¾	2	2½	3	3½	4
No. 4.... Rs.	1 8 0	1 13 6	..	.	..	..	..	..	..	..	..
„ 5 „	1 9 6	2 0 0	..	..	..	..	..	..	..	..	..
„ 6 „	1 12 0	2 4 0	2 12 0	3 4 0	4 0 0	..	..	..	..	..	..
„ 8 „	2 4 0	2 10 9	3 5 6	4 0 0	4 10 9	5 8 0	6 4 0	..	..	..	..
„ 9 „	..	3 0 0	3 10 9	4 6 9	5 2 9	5 14 9	6 12 0	..	..	..	..
„ 10 „	..	4 5 6	4 1 6	4 14 9	5 12 0	6 9 6	7 6 9	10 0 0	..	..	..
„ 12 „	..	..	5 0 0	6 0 0	7 0 0	8 0 0	9 0 0	11 0 0	14 8 0	16 8 0	..
„ 14 „	..	..	6 4 0	7 6 9	8 9 6	9 12 0	10 14 9	13 4 0	15 12 0	18 0 0	22 8 0
„ 16 „	..	..	7 14 0	9 2 9	10 8 0	11 13 6	13 2 9	15 14 0	18 8 0	22 0 0	25 0 0
„ 18 „	..	..	..	..	13 0 0	14 8 0	16 0 0	19 0 0	22 0 0	26 0 0	29 0 0
„ 20 „	..	..	..	..	15 14 0	17 8 0	19 2 9	22 8 0	35 8 0	30 0 0	33 8 0
„ 22 „	..	..	..	..	..	..	22 12 0	26 8 0	30 0 0	35 0 0	39 0 0
„ 24 „	..	..	..	..	..	..	26 12 0	30 12 0	34 12 0	40 0 0	45 0 0

Prices for larger sizes and Round Head Screws on application.

Screws, Pins and Nails.

Whitworth's Machine Screws.

Countersunk Heads.



Price per Gross.

Length. Ins.	¾	1	1¼	1½	1¾	2	2¼	2½	3
	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.
¼ in.	2 7	2 7	2 14	3 4	3 10	4 0	4 10	5 4	..
5/16 "	4 0	4 6	4 14	5 6	5 14	6 8	6 15	7 8	9 15
⅜ "	6 6	6 6	6 12	7 2	7 12	8 4	8 14	9 8	13 8
½ "	..	14 12	16 8	18 4	19 8	22 0	24 8	27 0	31 12
⅝ "	..	36 0	..	39 0	..	48 0	..	..	..

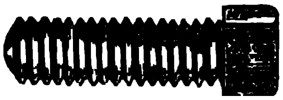
Prices for Round Head Machine Screws on application.

Set Screws.

Square Heads.

Square and Hexagonal Heads.

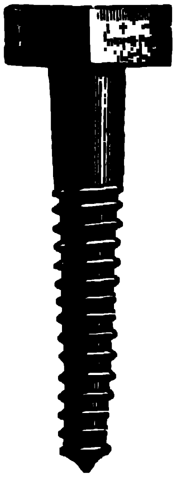
Price per Gross.



Hexagonal Heads.

Length. In.	¼	5/16	⅜	½	¼	5/16	⅜	½
	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.	Rs. As.
¾ ins.	7 12	9 2	12 12	..	7 12	9 2	12 12	..
1 "	8 8	10 4	14 2	22 8	8 8	10 4	14 2	22 8
1¼ "	9 2	11 4	15 8	23 14	9 2	11 4	15 8	23 14
1½ "	9 14	12 8	16 14	26 12	9 14	12 8	16 14	26 12
2 "	11 4	14 8	19 12	31 0	11 4	14 8	19 12	31 0

Prices for Cheese Head Screws on application.



Patent Pointed Galvanized Coach Screws.

Square Heads.

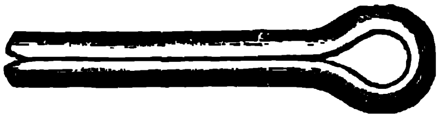
Diameter. In.	3/16 & ¼	5/16	⅜	7/16	½
	Rs As.	Rs As.	Rs As.	Rs. As	
Length, 1½ ins. Price, per Gross ..	7 12	11 12	..	..	
" 2 " " " " ..	8 8	13 0	16 12	25 0	29 0
" 2½ " " " " ..	9 8	14 8	18 8	27 0	32 8
" 3 " " " " ..	10 4	15 12	20 4	29 0	35 0
" 3½ " " " " ..	..	16 12	22 0	31 8	38 0
" 4 " " " " ..	..	18 0	23 8	33 12	40 0
" 4½ " " " " ..	..	..	..	36 0	43 0
" 5 " " " " ..	..	..	..	38 0	46 0
" 5½ " " " " ..	..	..	..	..	48 0
" 6 " " " " ..	..	..	..	..	50 8

Prices for Hexagonal Head Coach Screws on application.

Screws, Pins and Nails.

Split Pins or Cotters.

Split Pins are made slightly under gauge in order to fit holes drilled to the diameters named.



Price per Gross.

Length .. Ins.	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs A	Rs A.	Rs. A	Rs A.	Rs. A.	Rs. A	Rs. A.
1/16" Nominal Diam. .	0 12	0 13	0 15	1 1	1 3	1 5	1 6	1 8	1 10	..	..
1/8" ,, .	0 13	0 14	1 0	1 2	1 4	1 6	1 8	1 10	1 12	1 14	2 4
3/16" ,, .	1 1	1 3	1 5	1 6	1 8	1 10	1 12	1 14	2 1	2 6	2 12
1/4" ,, ..	1 10	1 12	2 0	2 4	2 7	2 10	2 12	2 15	3 4	3 12	4 4
5/16" ,, ..	.	.	5 4	5 10	6 0	6 6	6 12	7 4	7 12	8 0	10 0
3/8" ,, .	.	..	..	.	7 2	7 12	8 4	8 12	9 4	10 4	11 4
7/16" ,, .	.	..		..	.	..	9 8	10 4	10 14	12 0	13 0
1/2" ,, .	..	..	..	.	..	.	13 4	..	15 8	17 12	20 8

Prices for other sizes on application.

Brass Split Pins or Cotters.

Length .. Ins.	1	1¼	1½	1¾	2	2¼	2½	2¾	3
	Rs. A.	Rs. A	Rs. A.	Rs. A	Rs. A	Rs. A	Rs A	Rs. A.	Rs. A
1/16" Nominal Diam. ..	1 10	1 14	2 2	....	...	....	....	....	....
1/8" ,, ..	1 12	2 0	2 5	2 12	3 0	3 6	3 10	4 0	4 6
3/16" ,, ..	3 8	4 4	4 14	5 10	6 6	7 4	8 0	8 12	9 8
1/4" ,, ..	....		8 6	9 9	10 12	12 0	13 4	14 8	15 12
5/16" ,,	....	.. .	....	....	21 0	....	27 0	. ..	31 0

Prices for other sizes on application.

French Wire Nails.

Size .. .. Ins.	½	¾	1	1¼	1½	2	2½	3	3½	4	
Thickness, B.W.G.	19	17	15	11	11	11	10	8	8	7	
Price, per cwt. Rs.	35 0	35 0	20 0	20 0	20 0	20 0	20 0	20 0	20 0	18 0	18 0

Grover Patent Spring Washers.

Sizes in stock .. .. Ins.	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜
Price, per 1,000 .. .. Rs.	45 0	62 0	70 0	85 0	95 0	105 0	120 0	130 0	224 0

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

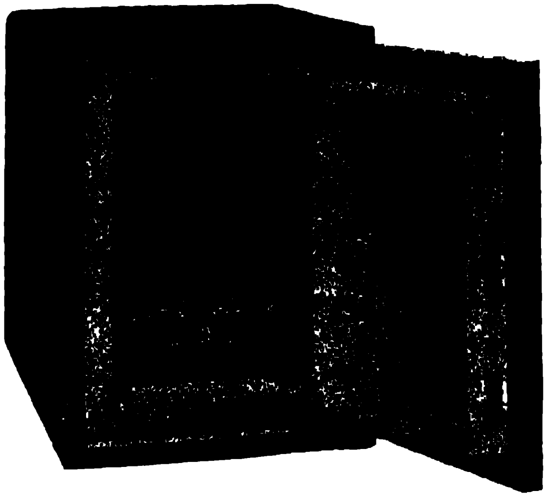
JESSOP & Co. Ltd ENGINEERS

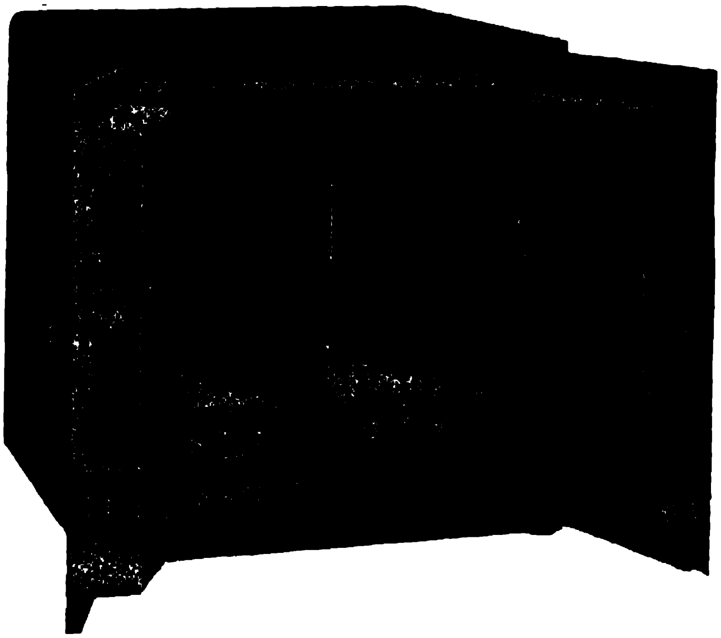
RANGOON, MADRAS, BOMBAY, LONDON.

Steel Fire and Thief-Resisting Safes.

Manufactured by Leading English Maker.

Strong and Durable in Construction.





These Safes are fitted with 3-in. fire-proof chambers, filled with patent fire-resisting composition, solid steel doors, fitted with Patent Unpickable Powder-proof 6-Lever Locks and duplicate plated Keys.

Locks protected by drill-proof plate made and finished in a first class manner.

Partitions and Shelves fitted as desired at a small extra cost according to sizes.

Single Door.

Outside Measure			Inside Measure (over drawers).				Price.
Height.	Width.	Depth.	Height.	Width.	Depth.		Rs.
24″ ×	17″ ×	16″	14″ ×	11¼″ ×	10″	1 Drawer	150
26″ ×	18″ ×	17″	16″ ×	12″ ×	11″	1 „	165
28″ ×	19″ ×	18″	18″ ×	13″ ×	12″	2 Drawers	185
32″ ×	21″ ×	20″	21″ ×	15½ ×	14″		220

Double Door.

Outside Measure.			Inside Measure (over drawers).			Fittings.	Price
Height.	Width.	Depth.	Height.	Width.	Depth.		Rs.
30″ ×	30″ ×	20″	19″ ×	23½″ ×	12″	2 Drawers, 1 Partition.	300
36″ ×	36″ ×	24″	24″ ×	29½″ ×	16″	2 „ 1 „ 1 Shelf.	400
42″ ×	38″ ×	27″	30″ ×	30½″ ×	19″	2 „ 1 „ 1 Shelf.	600
48″ ×	44″ ×	28″	36″ ×	37″ ×	20″	2 „ 1 „ 1 Shelf.	720

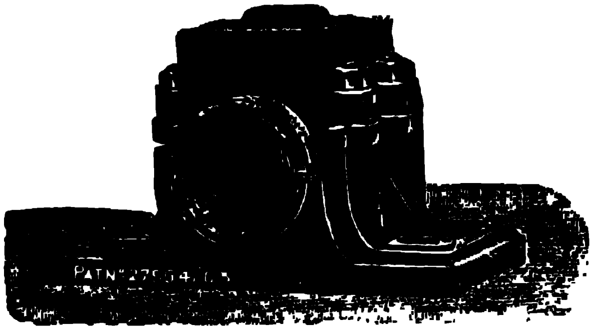
DELISTED

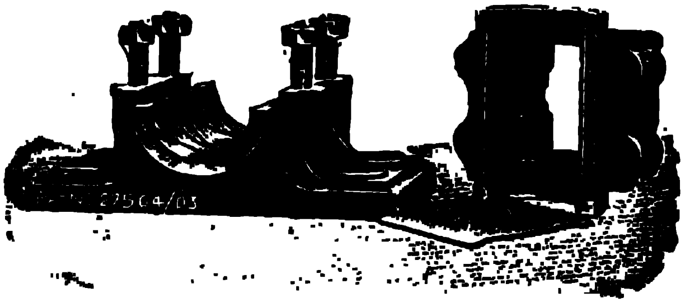
Prices for other sizes on application.

Travelling Cash Chests, Phipps' Patent. **Price, Rs. 300-0 each.**

Strong Room Doors. **Prices and particulars on application.**

Calypsol Solid Lubricant.





"Calypsol" Solid Lubricant is now generally recognised as the most suitable lubricant for shafting in mills and workshops, and numerous tests made have demonstrated that it is cheaper, cleaner and more efficient than any other lubricant. It is suitable for large and small bearings, and engine and special bearings can be adapted for its use.

Method of Application.—The bearing cap is generally made in the form shown in the illustration, though other forms can be used suitable for swivel and special bearings. The lubricant box is packed with calypsol yarn and a narrow "V" or "diamond" space is left in the centre for the grease. Once packed, the bearing can be left to look after itself for months. In a recent trial made, an ordinary workshop bearing used less than 2½ ounces of the lubricant in 3 months, and figures taken for the cost of lubricating a large jute mill show that the cost is well **under Rs. 230 per month for a 600 loom mill.**

The lubricant is sold in 28-lb., 56-lb. and 1-cwt. drums.

	Yarn.	Grease.
Price in 28-lb. drums.	**Rs. 113** per cwt.	**Rs. 106** per cwt.
	,, **108** ,, ,,	,, **101** ,, ,,
1 cwt. ,,	,, **103** ,, ,,	,, **96** ,, ,,

"Stauffer's" Lubricant.

Stauffer's Lubricant is a perfectly neutral grease, having a melting point of 212°F. It reduces friction and consequently wear and tear to the minimum, does not drip or run to waste, reduces fire risks and costs.

The lubricant is sold in 28-lb., 56-lb. and 1-cwt. drums.

Price in 28-lb. drums.	**Rs. 81 0** per cwt.
,, ,, 56 ,, ,,	,, **78 0** ,, ,,
,, ,, 1-cwt. ,,	,, **75 0** ,, ,,

Atlas Grease.

A good quality solidified oil at a reasonable price.

Price in 28-lb. drums.	**Rs. 52 8** per cwt.
,, ,, 56 ,, ,,	,, **48 8** ,, ,,
,, ,, 1-cwt. ,,	,, **45 8** ,,

Gas and Oil Engine Cylinder Oil.

This oil is specially imported by us for lubricating cylinders, pistons, valve spindles, etc., of gas and oil engines. It is refined to meet the stringent conditions for which it is to be used and prevents carbonisation and gumminess.

	Original Grade for Engines up to 60 B. H. P.	**Medium Grade for Engines from 70|100 B.H.P.**
In 5-gallon drums	**Rs. 4-0 per gallon.**	**Rs. 4-8 per gallon.**
In 42-gallon casks	**,, 3-8 ,, ,,**	**,, 4-0 ,, ,,**

Mild Steel Shafting.

Lathe Turned and Polished.

We supply Mild Steel Shafts turned from hot-rolled or hammered homogeneous mild steel bars, straightened both before and after being turned, and uniformly finished by a process which gives a highly polished and hardened surface with resultant stiffness, ensuring light running and the minimum losses in transmission.

When the order includes keying and fitting of couplings, wheels, pulleys, clutches, etc., careful attention is paid to assembling of the various parts, and fitting and marking of the keys for re-erection.

Line Shafting.

Carrying Pulleys, etc.

Approximate limit of distance apart of Centres of Bearings for Shafts which do not carry more than an average number of pulleys transmitting normal powers

Dia. of Shaft in Inches.		1¾									4½		5½	
Revs. per Minute.	Distance between Bearing Centres in feet													
100	7¼	7½	8	8½	9	9½	10	10½	11	11½	12	13	14	15
150	6¾	7¼	7¾	8¼	8¾	9¼	9¾	10¼	10¾	11¼	11¾	12¾	13¾	14½
200	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12¼	13¼	14
250	6	6¾	7¼	7¾	8¼	8¾	9¼	9¾	10	10½	11	11¾	12½	13¼
300	5¾	6½	7	7½	8	8½	8¾	9¼	9½	10	10½	11	11¾	12½
350	5¼	6	6¾	7¼	7¾	8	8½	8¾	9	9½	9¾	10¼	11	11½
400	5	5¾	6½	7	7½	7¾	8	8¼	8½	8¾	9	9½	10	10½
500	4½	5½	6¼	6½	7	7½	7¾	8	8¼	8½	8¾	9¼	9½	10
600	4¼	5¼	6	6¼	6½	7	7¼	7½	8	8¼	8½	9	9¼	9½
700	4	4¾	5½	5¾	6	6½	7	7¼	7¾	8	8¼	8½	8¾	..
800	3¾	4¼	5	5¼	5½	6	6½	7	7½	7¾	8	8¼	..	..
1,000	3½	4	4½	4¾	5	5½	6	6½	7	..	..	..	..	..

Prices and Particulars.

Diameter of Shaft. Inches.	† Price per foot of Plain Shaft.	Price for Key beds for each half coupling	Price for Key beds in Body per foot	H. P. at 100 R.P M.	Approx. net weight per foot.
1½	Rs. 1-6	Rs. 1-8	Rs. 2-4	6¼	6·01
1¾	„ 1-12	.. 1-8	„ 2-8	10	8·18
2	„ 2-0	„ 1-8	.. 2-8	12½	10·68
2¼	„ 2-8	.. 2-0	.. 3-0	17½	13·52
2½	„ 3-2	„ 2-0	„ 3-0	25	16·69
2¾	„ 3-12	„ 2-4	„ 3-8	30	20·19
3	„ 4-8	„ 2-4	„ 3-8	40	24·03
3¼	„ 5-4	„ 2-8	„ 4-0	50	28·21
3½	„ 6-2	„ 2-8	„ 4-0	60	32·71
4	„ 8-0	„ 3-0	„ 4-8	100	42·73
4½	„ 10-2	„ 3-8	„ 5-0	140	54·07
5	„ 12-8	„ 3-12	„ 6-0	190	66·76
5½	„ 15-2	„ 4-8	„ 6-8	250	80·78
6	„ 18-0	„ 5-8	„ 6-8	340	96·13
6½	„ 22-8	„ 6-8	„ 7-8	450	112·82
7	„ 24-8	„ 6-8	„ 7-8	560	130·85

† The above prices are for standard lengths of 22 feet.

The horsepowers given above are for ordinary line shafting, and not for shafts carrying heavy main driving pulleys or wheels.

Cast-Iron Flanged Couplings.

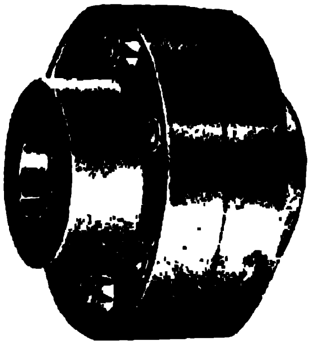


Fig. 1.

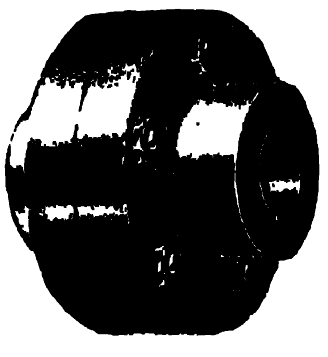


Fig. 2.

Machined and polished all over, bored, keyways cut, bolt holes drilled and fitted with turned steel bolts having bright hexagon heads and nuts.

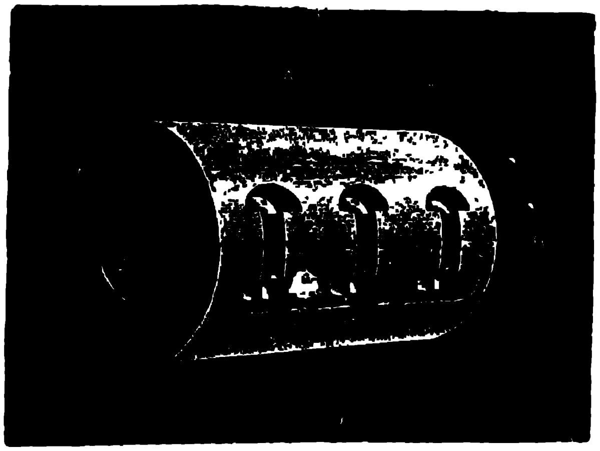
Fig. 1. **Recessed Flange Coupling,** all bolt heads and nuts being shrouded.

Fig. 2. **Flanged Coupling,** all bolt heads and nuts recessed, sometimes preferred where a specially heavy coupling is required as in Jute Mills.

Diam of Shaft	Ins	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4
„ „ Flange	„	7½	8¼	8¾	9¾	10	10¼	10½	11¼	12	12¾
„ „ Boss	„	3	3½	4	4½	4¾	5	5¼	5½	6	6¾
Length of Half Coupling	„	2½	2⅝	2¾	3	3⅛	3⅜	3½	3¾	4	4¼
Number of Bolts		4	4	5	6	6	6	6	6	6	6
Diam. of Bolts	Ins	⅝	⅝	⅝	⅝	⅝	¾	¾	⅞	⅞	1
Price, Fig. 1 „ Fig. 2	Rs „	20-0	22-0	25-0	28-0	32 0	35 0	40-0	45-0	50-0	65-0
Extra for keying on Shafts and Facing..	„	10-0	10-0	12-0	12-0	12-0	14-0	14-0	16-0	16-0	18-0

Prices of larger sizes on application.

Split Muff Coupling.



Bored to grip shaft tightly, keyways cut, turned all over and shrouded bolt heads and nuts. The keyway is cut parallel and one long key supplied.

Diameter of Shaft.	Dimensions.* A	B	C
Ins.	Ins.	Ins.	Ins.
2	9	5⅝	½
2¼	10⅛	6½	⅝
2½	10⅛	6½	⅝
2¾	10⅝	7	¾
3	10⅝	7	¾
3¼	12⅜	8	⅞
3½	12⅜	8	⅞
3¾	14⅛	9	1
4	14⅛	9	1

Prices of above and other sizes on application.

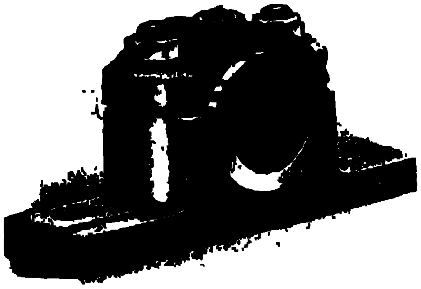
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

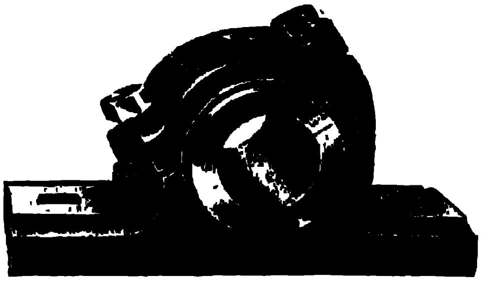
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Cast-Iron Plummer Blocks.

We standardise these in various sizes and types of heavy and medium design, either plain or ring oiled. The brasses are made of the best gun-metal and may be either turned externally or octagonal shape bedded into the block.

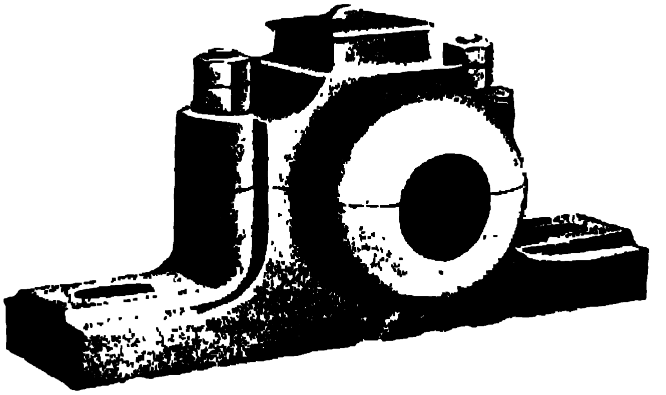




Plain Plummer Blocks.

Diameter of Shaft.	Ins.	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	
Height to Centre	Ins.	2	2¼	2½	2½	2¾	3	3¼	3½	3¾	4¼
Length of Base	„	10½	11¼	12¼	12¾	13	13¼	14½	15	16¾	18¼
Width of Base	„	2½	2½	2¾	3	3	3¼	3½	3¾	3¼	4
Centre to Centre of Holding-down Bolts	„	8		9½	10	10¼	10½	11½		13¼	14½
Medium Design, Ordinary Pattern, **Price,**	**Rs.**	**14-0**	**16-0**	**18-0**	**21-0**	**23-0**	**30-0**	**35-0**	**45-0**	**50-0**	**70-0**

Prices and dimensions of Heavy and Angular Types on application.



Loose Ring Oiling Plummer Blocks.

Diameter of Shaft.	Ins.	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4
Height to Centre	Ins.	3	3⅛	3¼	3⅝	4	4⅛	4¼	4⅜	4½	5¾
Length of Base	„	13½	13¾	14¾	15½	16¼	16⅝	17	17½	18	20
Width of Base	„	2¾	3	3½	4	4¼	4¾	5¼	5½	6	7¼
Centre to Centre of Holding-down Bolts	„	10½	10¾	11½	12¼	13	13¼	13½	14	14½	16
Price,	**Rs.**	**23-0**	**26-0**	**30-0**	**33-0**	**36-0**	**40-0**	**48-0**	**60-0**	**75-0**	**110-0**

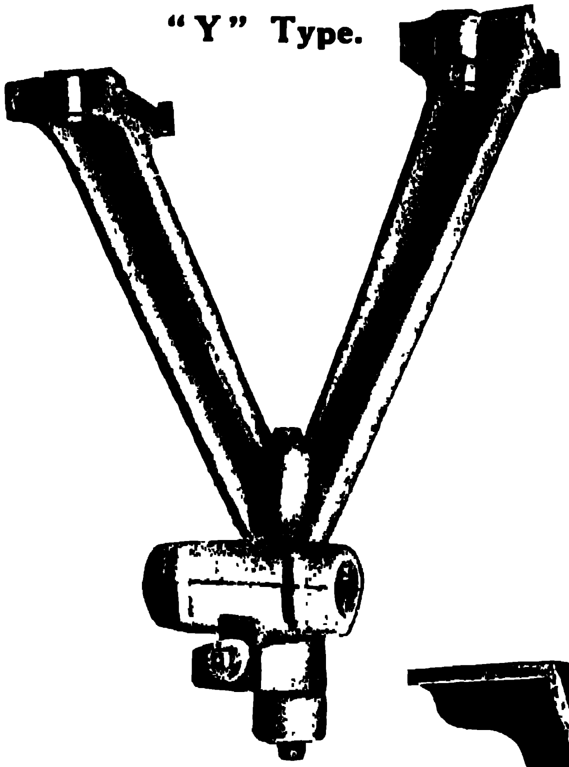
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Cast-Iron Hangers, Brackets, Etc.

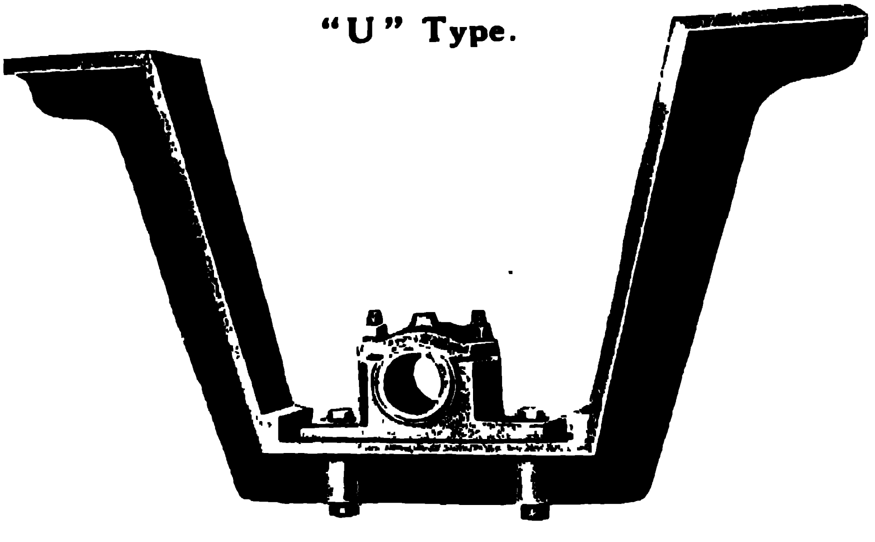
"Y" Type.



This represents a design of Hanger Brackets usually adopted in Jute and other Mills for line shafting up to 6½ inches diameter. It is also suitable for Workshops in any positions where the shaft has to be supported from roof girders or trusses. The feet can be made to suit any section of beam or truss, and in places, where the bearing comes in a space between two trusses, the Hanger Bracket is fixed to a horizontal channel fixed to the trusses by hook bolts.

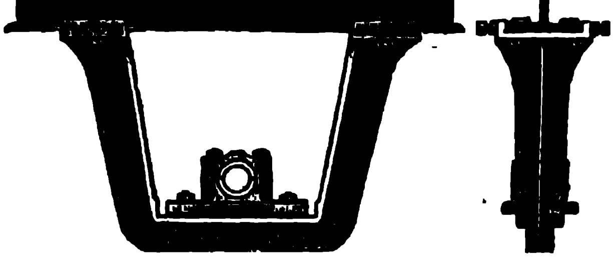
The bearing has vertical and horizontal adjustment and can swivel in both directions. The bottom half is bushed with gun-metal, the top half being generally cast-iron throughout. These bearings can be fitted with open tops for Calypsol solid lubricant if desired.

"U" Type.

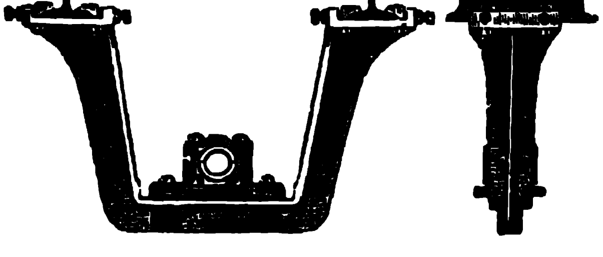


This represents a common design of roof support for shafting in Mills and Workshops where plain Plummer Blocks are used and levelling is done by means of packings.

Hangers for Joists, Beams or Gutters.



For shafts at right-angles to Beams.



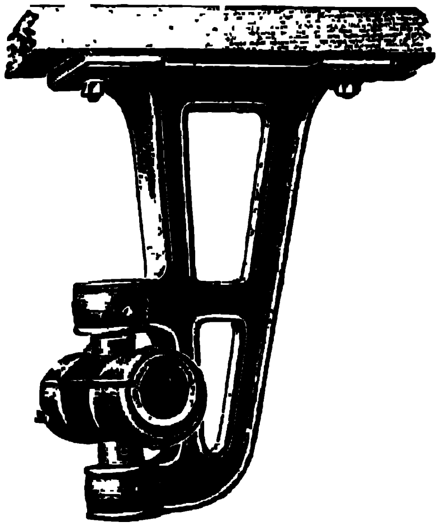
For shafts parallel with Beams.

Full particulars and prices on application.

Swivel Bearings.

With Hangers, Stands and Brackets.

Type "A."



Open Side

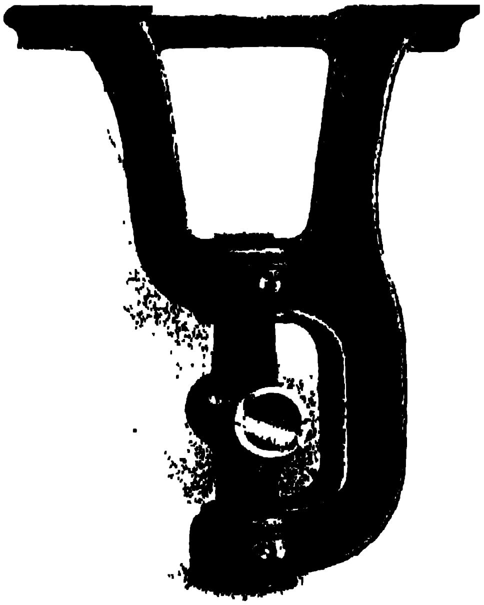
Hangers.

Swivelling Bearings,

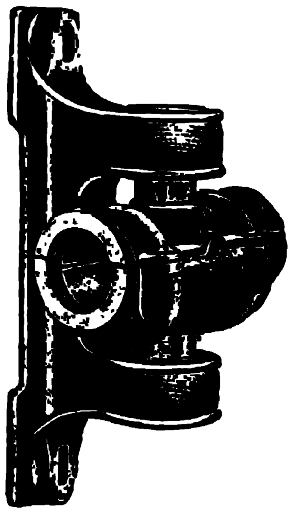
Vertical Adjustment.

Plain or Ring Oiling.

Type "B."



Wall Bracket.

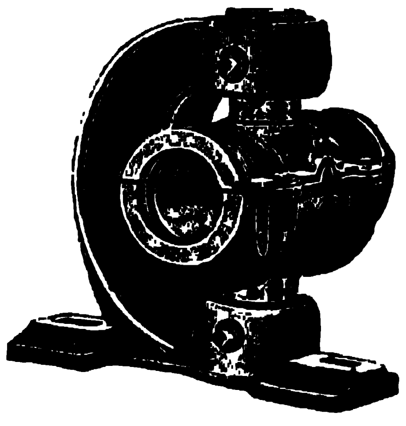


Swivelling Bearings,

Vertical Adjustment.

Plain or Ring Oiling.

Floor Stand.



We illustrate above a few designs of Swivel Bearings with Hangers, etc., for mills and workshops. Special designs can be made to suit any particular cases.

Full particulars and prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

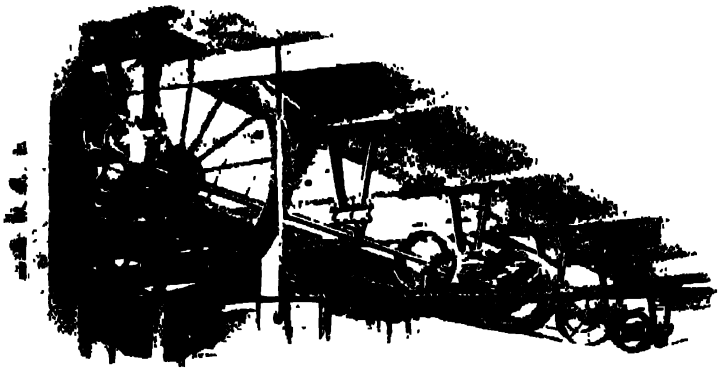
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ball and Roller Bearings.

By the Hoffmann Manufacturing Co., Ltd.

The economical distribution of power is a more pressing problem to-day than ever before. Fuel and labour costs are high, power plant is costly, but nevertheless the ratio of horsepower consumed in every industry is continually increasing. It therefore becomes of vital importance to ensure that every unit of power generated shall be expended in useful work.



Every hour that the plain bearing runs, both bush and shaft are wearing, steadily deteriorating, consuming power and wasting oil. By eliminating the sliding friction of the plain bush and substituting the rolling friction of Balls or Rollers it is possible to obtain a bearing with the lowest known co-efficient of friction, the lowest consumption of lubricant, and one which will run continuously over indefinite periods without shewing the least measurable wear, or calling for any attention whatever, a bearing which cannot seize or run hot, and in which the starting effort is as low as the running friction.

It would frequently be of the greatest advantage to factory experts to be able to run line-shafting at higher speeds. Heretofore this has been dismissed as being impracticable owing to the limitations of the plain bearings. To run line shafting at high speeds on plain bearings means greater frictional losses, greater oil consumption and continuous attention to the bearings. With the use of "Hoffmann" Bearings much higher speeds become practicable. This means smaller shaftings, smaller pulleys, and more convenient driving Speeds.

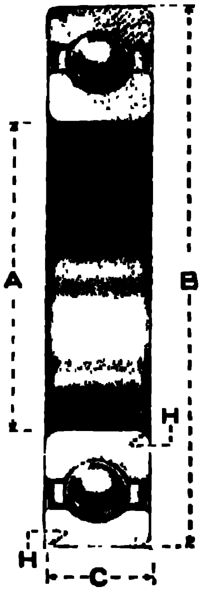
It has been proved by the highest independent authority in Great Britain (the National Physical Laboratory) that 90 per cent. of friction losses can be eliminated by the use of "Hoffmann" Bearings.

As Sole Agents in India and Burma for The Hoffmann Manufacturing Co., Ltd., we are able to offer expert advice and shall be pleased to send special literature and estimates on receipt of necessary details.

HOFFMANN Ball and Roller Bearings.

Ball Journal Bearings.

Light Type—Parallel Hole. Fig. 116. (Inch Sizes.)

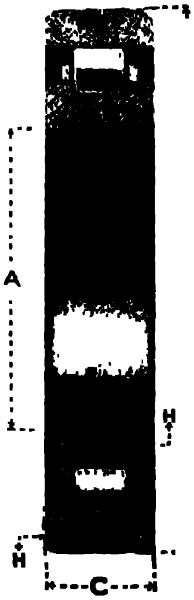


No.	A	B	C	H	Price. Rs	A	No.	A	B	C	H	Price. Rs.	A.
LS5	1/2	1 5/16	3/8	1/32	6	0	LS17	2 1/2	5	15/16	3/32	24	4
LS7	5/8	1 9/16	7/16	1/32	6	8	LS18	2 3/4	5 1/2	15/16	3/32	28	4
LS8	3/4	1 7/8	9/16	1/16	7	0	LS19	3	5 3/4	1 1/16	3/32	32	12
LS9	7/8	2	9/16	1/16	7	8	LS19 1/2	3 1/4	6	1 1/16	3/32	37	4
LS10	1	2 1/4	5/8	1/16	8	0	LS20	3 1/2	6 1/2	1 1/8	1/8	42	4
LS11	1 1/8	2 1/2	5/8	1/16	8	12	LS20 1/2	3 3/4	6 3/4	1 1/8	1/8	49	0
LS12	1 1/4	2 3/4	11/16	1/16	9	4	LS21	4	7 1/4	1 1/4	1/8	55	4
LS12 1/2	1 3/8	3	11/16	1/16	10	4	LS21 1/2	4 1/4	7 1/2	1 1/4	1/8	61	12
LS13	1 1/2	3 1/4	3/4	3/32	11	8	LS22	4 1/2	8	1 5/16	1/8	68	0
LS13 1/2	1 5/8	3 1/2	3/4	3/32	13	0	LS22 1/2	4 3/4	8 1/4	1 5/16	1/8	74	12
LS14	1 3/4	3 3/4	13/16	3/32	14	0	LS23	5	9	1 3/8	1/8	81	0
LS14 1/2	1 7/8	4	13/16	3/32	16	8	LS23 1/2	5 1/2	9 1/2	1 3/8	1/8	95	12
LS15	2	4	13/16	3/32	16	8	LS24	6	10 1/2	1 9/16	5/32	111	0
LS16	2 1/4	4 1/2	7/8	3/32	20	8	LS24 1/2	6 1/2	11	1 9/16	5/32	126	0

Prices for Heavy Type and Metric Sizes on application.

Roller Journal Bearings.

Light Type—Parallel Hole. Fig. 197. (Inch Sizes.)



No.	A	B	C	H	Price. Rs	A	No.	A	B	C	H	Price. Rs.	A.
RLS10	1	2 1/4	5/8	1/16	12	4	RLS19	3	5 3/4	1 1/16	3/32	43	12
RLS11	1 1/8	2 1/2	5/8	1/16	13	4	RLS19 1/2	3 1/4	6	1 1/16	3/32	50	8
RLS12	1 1/4	2 3/4	11/16	1/16	14	0	RLS20	3 1/2	6 1/2	1 1/8	1/8	57	0
RLS12 1/2	1 3/8	3	11/16	1/16	15	8	RLS20 1/2	3 3/4	6 3/4	1 1/8	1/8	65	8
RLS13	1 1/2	3 1/4	3/4	3/32	16	8	RLS21	4	7 1/4	1 1/4	1/8	73	12
RLS13 1/2	1 5/8	3 1/2	3/4	3/32	18	0	RLS21 1/2	4 1/4	7 1/2	1 1/4	1/8	82	8
RLS14	1 3/4	3 3/4	13/16	3/32	19	4	RLS22	4 1/2	8	1 5/16	1/8	91	4
RLS14 1/2	1 7/8	4	13/16	3/32	21	4	RLS22 1/2	4 3/4	8 1/4	1 5/16	1/8	99	8
RLS15	2	4	13/16	3/32	21	4	RLS23	5	9	1 3/8	1/8	108	0
RLS16	2 1/4	4 1/2	7/8	3/32	27	0	RLS23 1/2	5 1/2	9 1/2	1 3/8	1/8	126	8
RLS17	2 1/2	5	15/16	3/32	32	12	RLS24	6	10 1/2	1 9/16	5/32	146	4
RLS18	2 3/4	5 1/4	15/16	3/32	38	0	RLS24 1/2	6 1/2	11	1 9/16	5/32	166	0

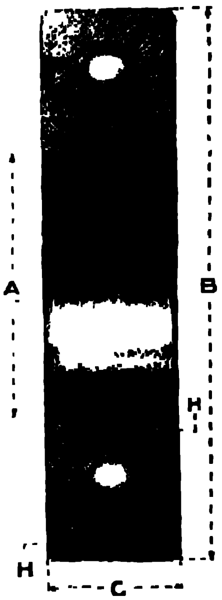
Prices for Metric Sizes on application.

HOFFMANN

Ball and Roller Bearings.

Ball Journal Bearings.

Medium Type—Parallel Hole. Fig. 150. (Inch Sizes.)

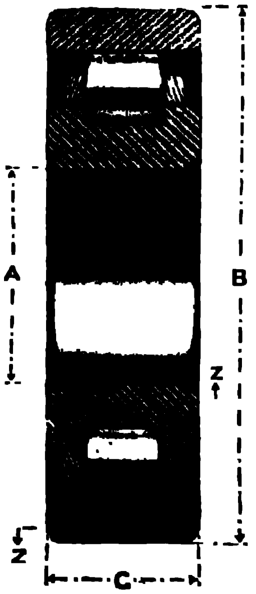


No.	A	B	C	H	Price. Rs.	A.	No.	A	B	C	H	Price Rs.	A.
MS1	1/4	1 1/16	9/16	1/16	5	12	MS16	2¼	5	1¼	1/8	32	0
MS3	3/8	1⅛	9/16	1/16	5	12	MS17	2½	5½	1¼	1/8	39	0
MS5	1/2	1⅝	5/8	1/16	6	0	MS18	2¾	6¼	1⅜	1/8	46	0
MS7	5/8	1 13/16	5/8	1/16	7	0	MS19	3	7	1 9/16	5/32	56	8
MS8	3/4	2	11/16	1/16	7	8	MS19½	3¼	7½	1 9/16	5/32	70	12
MS9	7/8	2¼	11/16	1/16	8	8	MS19¾	3⅜	7½	1 9/16	5/32	70	12
MS10	1	2½	3/4	3/32	9	8	MS20	3½	8⅛	1¾	5/32	79	4
MS11	1⅛	2 13/16	13/16	3/32	10	12	MS20½	3¾	8¼	1¾	5/32	91	0
MS12	1¼	3⅛	7/8	3/32	13	0	MS21	4	8½	1¾	5/32	103	8
MS12½	1⅜	3½	7/8	3/32	15	0	MS21½	4¼	8¾	1¾	5/32	117	4
MS13	1½	3¾	15/16	3/32	17	0	MS22	4½	9⅜	2	3/16	132	12
MS13½	1⅝	4	15/16	3/32	19	0	MS22½	4¾	10	2	3/16	156	12
MS14	1¾	4¼	1 1/16	3/32	21	8	MS23	5	10	2	3/16	156	12
MS14½	1⅞	4½	1 1/16	3/32	24	8	MS23½	5½	11	2	3/16	213	0
MS15	2	4½	1 1/16	3/32	24	8	MS24	6	12	2¼	3/16	249	0

Prices for Heavy Type and Metric Sizes on application.

Roller Journal Bearings.

Medium Type—Parallel Hole. Fig. 196. (Inch Sizes.)



No.	A				Price. Rs.	A.	No.	A		C	Z	Price. Rs.	A.
RMS7	5/8	1 13/16	5/8	1/16	10	0	RMS18	2¾	6¼	1⅜	1/8	60	4
RMS8	3/4	2	11/16	1/16	11	8	RMS19	3	7	1 9/16	5/32	72	0
RMS9	7/8	2¼	11/16	1/16	13	0	RMS19½	3¼	7½	1 9/16	5/32	87	0
RMS10	1	2½	3/4	3/32	14	8	RMS19¾	3⅜	7½	1 9/16	5/32	87	0
RMS11	1⅛	2 13/16	13/16	3/32	16	4	RMS20	3½	8⅛	1¾	5/32	96	0
RMS12	1¼	3⅛	7/8	3/32	18	0	RMS20½	3¾	8¼	1¾	5/32	109	8
RMS12½	1⅜	3½	7/8	3/32	19	8	RMS21	4	8½	1¾	5/32	122	8
RMS13	1½	3¾	15/16	3/32	22	0	RMS21½	4¼	8¾	1¾	5/32	136	8
RMS13½	1⅝	4	15/16	3/32	24	0	RMS22	4½	9⅜	2	3/16	153	0
RMS14	1¾	4¼	1 1/16	3/32	26	8	RMS22½	4¾	10	2	3/16	178	0
RMS14½	1⅞	4½	1 1/16	3/32	31	0	RMS23	5	10	2	3/16	178	0
RMS15	2	4½	1 1/16	3/32	31	0	RMS23½	5½	11	2	3/16	234	0
RMS16	2¼	5	1¼	1/8	40	0	RMS24	6	12	2¼	3/16	287	0
RMS17	2½	5½	1¼	1/8	49	8							

Prices for Metric Sizes on application.

HOFFMANN

Ball and Roller Bearings.

Single Thrust Washers.
Light Type. Figs. 159 and 160.

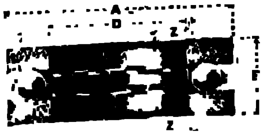


Fig. 159. Type W.
Sizes to W1⅞.

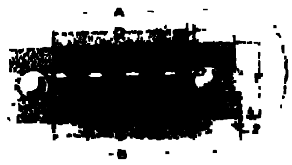


Fig. 160. Type W.
Sizes W2 to W6.

Fig. 159. Type W. No.	A	D	E	Price. Rs. A	Fig. 160. Type W. No.	A	B	D	E	Price. Rs. A.
W¼	13/16	¼	⅜	4 12	W2	2 15/16	2 31/32	2	¾	11 8
W5/16	1	5/16	17/32	4 12	W2⅛	3 3/16	3 7/32	2⅛	⅞	12 8
W⅜	1	⅜	17/32	4 12	W2¼	3 5/16	3 11/32	2¼	⅞	13 12
W7/16	1 9/32	7/16	⅝	4 12	W2⅜	3 9/16	3 19/32	2⅜	1	15 4
W½	1 9/32	½	⅝	5 0	W2½	3 11/16	3 23/32	2½	1	16 8
W9/16	1 11/32	9/16	⅝	5 8	W2⅝	3 13/16	3 27/32	2⅝	1	17 12
W⅝	1 13/32	⅝	⅝	5 8	W2¾	4	4 1/32	2¾	1	19 4
W¾	1 17/32	¾	⅝	5 12	W2⅞	4⅛	4 5/32	2⅞	1	20 12
W⅞	1 21/32	⅞	⅝	6 0	W3	4 5/16	4⅜	3	1⅛	22 4
W1	1 25/32	1	⅝	6 4	W3¼	4¾	4 13/16	3¼	1¼	25 12
W1⅛	1 29/32	1⅛	⅝	6 8	W3½	5	5 1/16	3½	1¼	30 0
W1¼	2 5/32	1¼	21/32	7 0	W3¾	5¼	5 5/16	3¾	1¼	35 0
W1⅜	2 7/32	1⅜	21/32	7 12	W4	5¾	5 13/16	4	1⅜	40 8
W1½	2 11/32	1½	21/32	8 8	W4½	6½	6 9/16	4½	1¾	54 4
W1⅝	2 15/32	1⅝	21/32	9 4	W5	7¼	7 5/16	5	2	70 8
W1¾	2 11/16	1¾	¾	10 0	W5½	8	8 1/16	5½	2⅜	87 4
W1⅞	2 13/16	1⅞	¾	10 8	W6	8⅝	8 11/16	6		

Prices for Medium and Heavy Type Single Thrust Washers, and Medium and Heavy Single Thrust Bearings with or without housing on application.

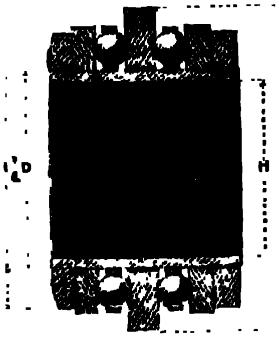


Fig. 217. Type WS.

Double Thrust Washers.

Light Type—With Sleeves. Fig. 217.

Fig. 217. Type WS. No.	B	G	H	Price. Rs. A.	Fig. 145. Type WD. No.	B	G	H	Price. Rs. A.
WS5	1 9/16	1 9/16	¼	13 0	WS16	3¾	2¼	1⅞	31 12
WS7	1 11/16	1 9/16	⅜	13 8	WS16½	4	2 7/16	2	34 0
WS8	1 13/16	1 9/16	½	14 0	WS17	4⅛	2 7/16	2⅛	36 4
WS9	1 15/16	1 9/16	⅝	14 12	WS17½	4¼	2 7/16	2¼	39 0
WS10	2 1/16	1 11/16	¾	15 8	WS18	4½	2 7/16	2⅜	41 12
WS11	2 3/16	1 11/16	⅞	16 8	WS18½	4⅝	2 7/16	2½	44 8
WS12	2 7/16	1 13/16	1	17 8	WS19	4 13/16	2¾	2⅝	47 12
WS12½	2⅝	1 13/16	1⅛	18 8	WS19½	5¼	3⅛	2¾	57 4
WS13	2¾	1 13/16	1¼	20 0	WS20	5½	3⅛	3	58 12
WS13½	2⅞	1 15/16	1⅜	21 8	WS20½	5¾	3⅛	3¼	67 0
WS14	3 1/16	1⅞	1½	23 8	WS21	6¼	3⅜	3½	76 0
WS15	3 5/16	2	1⅝	27 4	WS22	7	4	4	100 12
WS15½	3⅝	2¼	1¾	29 8	WS23	7¾	4⅝	4½	128 12
					WS23½	8½	5	5	165 8
					WS24	9¼	5¼	5½	193 0

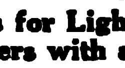
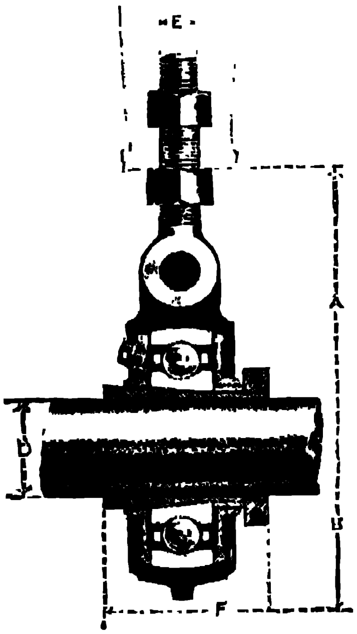


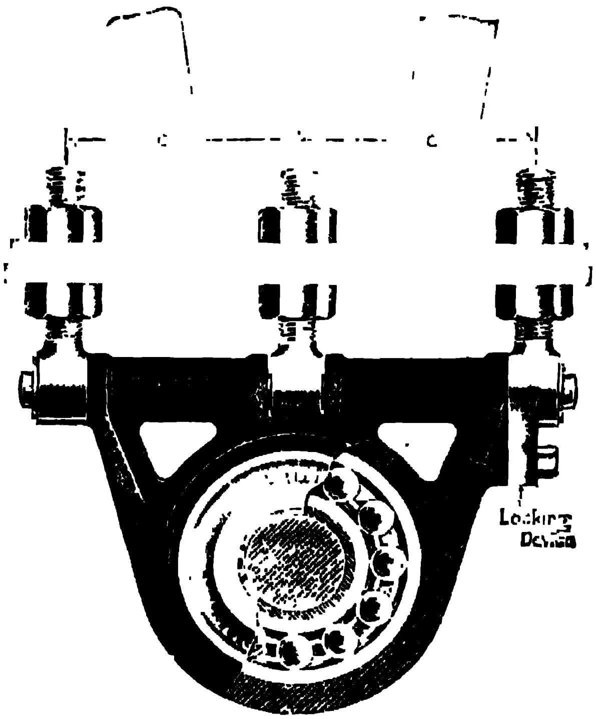
Fig. 145. Type WD.

Prices for Light Type Double Thrust Washers, Fig. 145, and Medium Type Double Thrust Washers with and without sleeves, and Heavy Type Double Thrust Bearings on application.

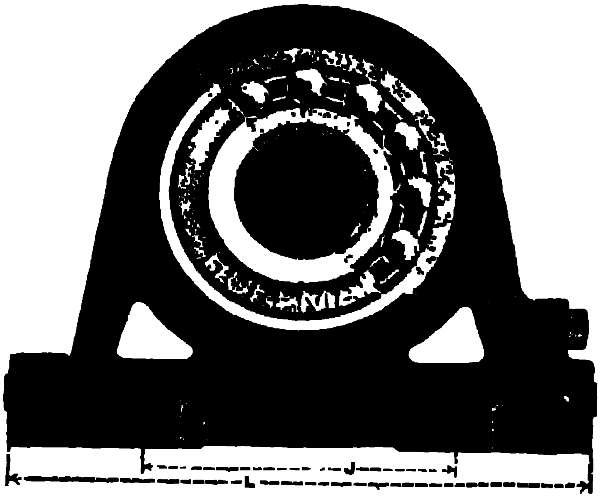
FFMANN Line Shaft Bearings and Fittings.

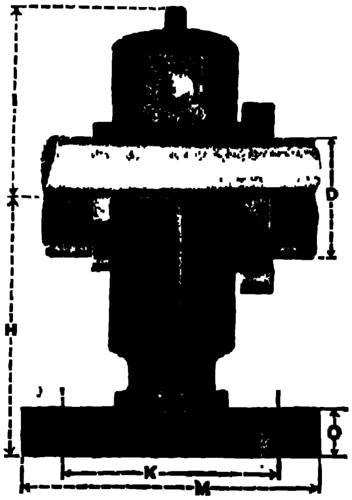
Self-Aligning Ball and Roller Bearing Hangers.





Self-Aligning Ball and Roller Bearing Pedestals.





HOFFMANN

Line Shaft Bearings and Fittings.

Self-Aligning Ball and Roller Bearing Hangers.

Size	D	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½
Drop ..	A in. from	4	4½	5	5⅛	5¼	6	6½	7¼	8	8¼	9¼	9¼	9¼	9¼
" ..	A in. to	4½	5	5¾	6	6¼	7	7½	8¼	9	9	10	10	10	10
Centre to bottom overall	B in.	2⅛	2⅜	2¾	2⅞	3 3/16	3 9/16	4⅛	4½	4 3/16	4½	4¾	5⅜	5⅜	6¼
Pitch of Bolts	C "	3⅛	3 13/16	4	4⅛	4¾	5 1/16	5 9/16	6¼	6½	6⅞	6⅞	7¼	7¼	8
Diameter of Bolts	E "	⅝	⅝	⅝	¾	¾	⅞	⅞	1	1	1	1¼	1¼	1¼	1¼
Length of sleeve	F "	2 7/16	2 9/16	2⅞	2 13/16	3¼	3⅜	3⅝	4	3⅝	3⅝	4	4½	4½	4¾
Approximate weight in lbs.		9	11	15	17	20	26	35	51	59	71	88	90	90	109
Price, each	Rs.	41 0	50 0	56 0	64 8	77 0	87 8	99 8	136 0	136 0	161 8	177 8	216 0	216 0	240 0

For illustration see opposite page.

Self-Aligning Ball and Roller Bearing Pedestals.

Size	D	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½
Height	H in.	3⅝	4	4⅜	4⅝	4¾	5¼	5½	7	7¼	7¾	8⅜	8⅛	8½	8¾
Centre to top overall	I "	2⅛	2⅜	2¾	2⅞	3 3/16	3 9/16	4⅛	4¾	4 3/16	4½	4¾	5⅜	5⅜	6¼
Pitch of Bolts	J "	3⅝	4⅜	5	5½	6⅛	5¾	6⅜	7½	8½	9¼	9¼	9¾	9¾	10½
" " "	K "	2⅞	3	3¼	3⅝	3⅞	4¼	4⅜	4¾	4⅞	4⅞	5½	6½	6½	6½
Diameter of Bolts	E "	½	½	⅝	⅝	⅝	⅝	¾	¾	¾	¾	¾	1	1	1
Length of Base	L "	7⅛	8½	9⅛	9 [illegible]	10 11/16	11⅛	12	14	15	16	16	17	17	19
Width of Base	M "	3 13/16	4⅛	4⅝	5	5¼	5⅝	6	6¾	6⅞	7	7⅝	9	9	9
Thickness of Bolt Holes	O "	¾	¾	⅞	⅞	⅞	⅞	1	1¼	1½	1⅝	1¾	2	2	2
Approximate weight in lbs.		11	14	19	21	26	30	42	62	70	91	108	115	115	148
Price each	Rs.	42 0	51 8	57 8	65 8	77 0	91 0	105 0	130 8	152 8	171 8	191 8	219 8	219 8	266 0

For illustration see opposite page.

Steel Balls.

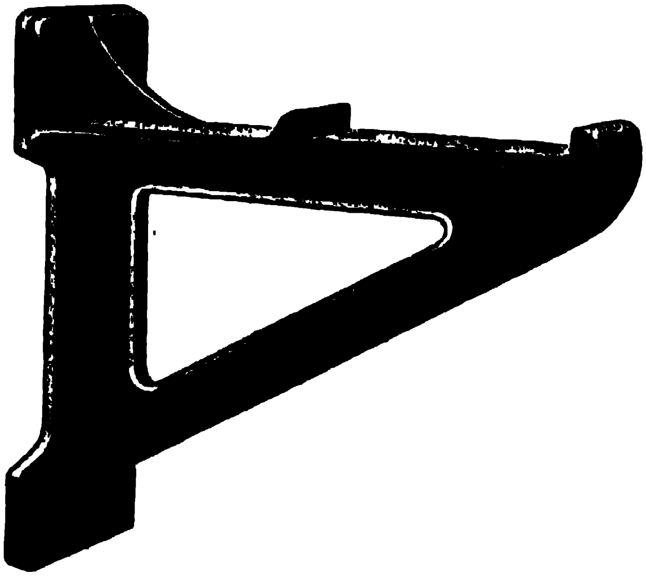
	Size Inches & m.m.	Price per Gross	Size Inches & m m.	Price per Gross	Size inches & m.m.	Price per Gross	Size inches & m.m.	Price per Gross	Size inches & m·m	Price per Gross	Size inches & m·m.	Price per Gross
		Rs. A.		Rs. A.		Rs. A.		Rs. A.		Rs. A.		Rs. A.
Inches .. m.m. ..	1/32 ...	12 12	13/64 7/32 5·0	1 9	23/64 3/8 9·0	6 12	33/64 17/32 13·0	16 8	43/64 11/16 17·0	31 8	53/64 27/32 ..	54 0
Inches .. m.m. ..	3/64 1/16 ...	2 12	15/64 1/4 6·0	2 2	25/64 13/32 10·0	8 0	35/64 9/16 14·0	18 8	45/64 23/32 18·0	33 0	55/64 7/8 ..	59 0
Inches .. m.m. ..	5/64 3/32 7/64 1/8 2·5 3·0	0 13	17/64 9/32 7·0	2 14	27/64 7/16 11·0	9 14	37/64 19/32 15·0	21 8	47/64 3/4 19·0	38 8	57/64 29/32 ..	66 8
Inches .. m.m. ..	9/64 5/32 ...	1 1	19/64 5/16 ...	4 0	29/64 15/32 ..	11 14	39/64 5/8 ...	24 0	49/64 25/32 ...	42 12	59/64 15/16 ..	72 0
Inches .. m.m. ..	11/64 3/16 4·0	1 5	21/64 11/32 8·0	5 8	31/64 1/2 12·0	13 12	41/64 21/32 16·0	27 12	51/64 13/16 20·0	48 8	61/64 31/32 63/64 1	77 0 83 0

Steel Rollers.

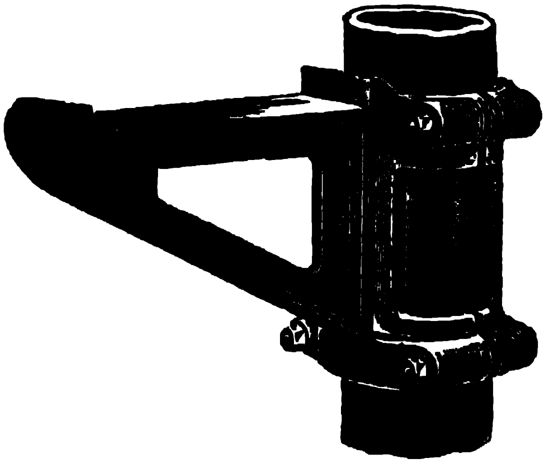
Size	Ins.	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1	1⅛	1¼
Price, per	% Rs.	11 8	10 4	14 8	20 0	27 0	35 8	45 0	54 0	64 0	75 0	88 8	105 0	122 0	139 12	175 0	230 0

Cast-Iron Hangers, Brackets, Etc.

Wall Brackets.

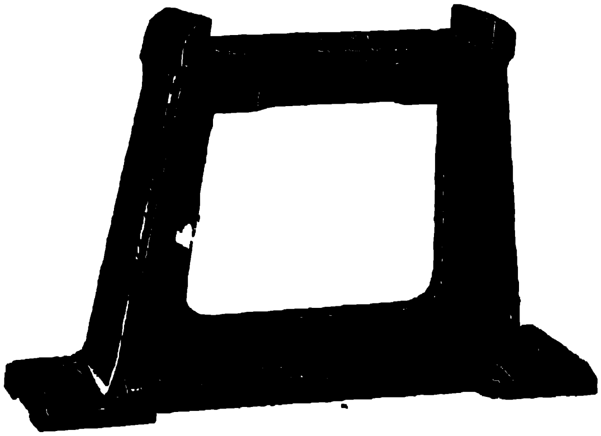


Column Brackets.

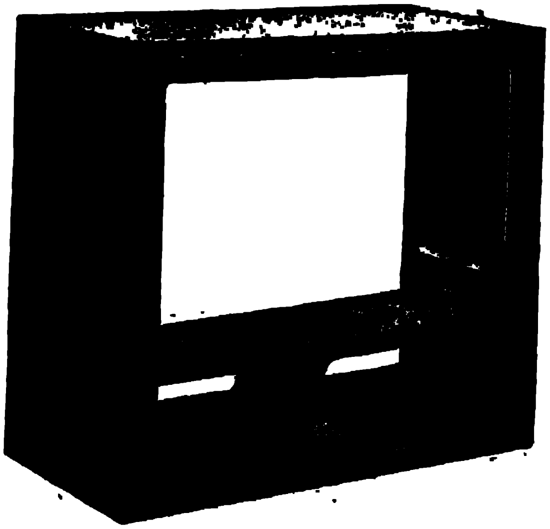


Sole or Base Plates.

Floor Stands.



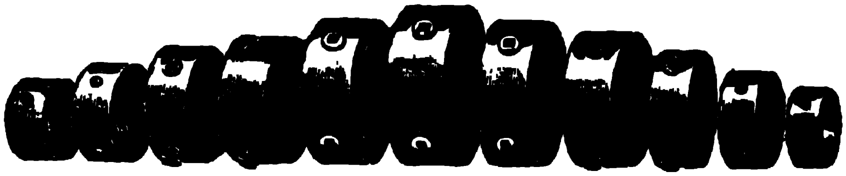
Wall Boxes.



Full particulars and prices on application.

Mild Steel Loose Collars.

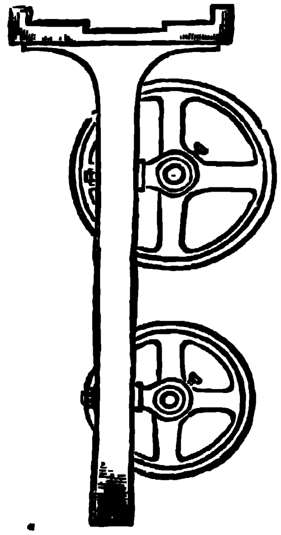
Machined Bright All Over.

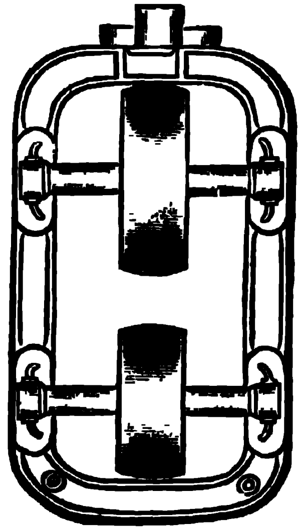


Set screws with square head or countersunk.

Diam. of Shaft. .. Ins.	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4
Price .. .. Rs.	3-0	3-8	4-0	4-8	5-0	5-8	6-0	7-0	9-0	10-0	12-0

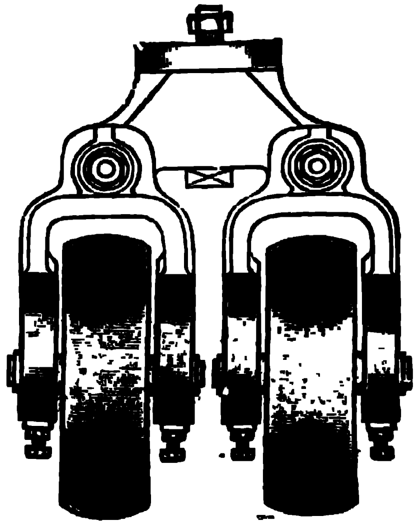
Prices for larger sizes on application.

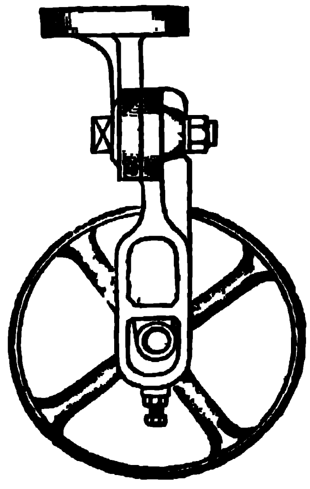




Gallows Belt Pulleys.

Used extensively in Mills and Workshops.





Mill Guide Pulleys.

For Spinning Frame Drives, with separate adjustment for each pulley.

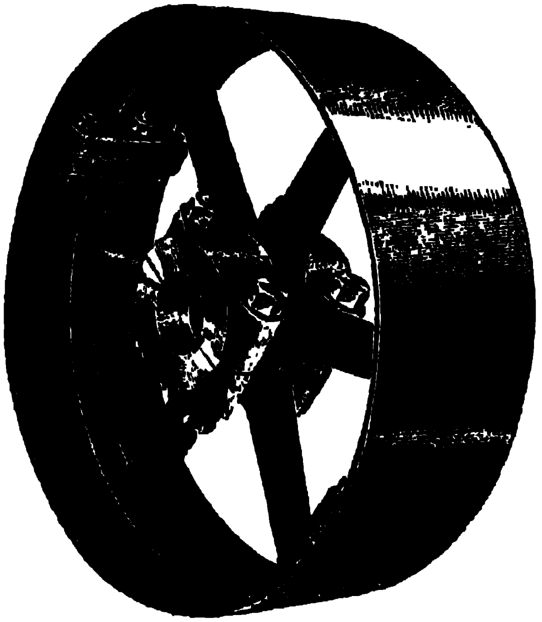
Particulars and Prices on application.

Wrought-Iron Pulleys.

With Single, Double, Treble or Four Rows of Arms.
Split or Solid, Round or Flat Face.

Cast-Iron Pulleys.

Split or Solid, Round or Flat Face.



Cast-Iron Pulleys are sometimes preferred to Wrought-Iron Pulleys as in the case of Oil Engine drives where the load is extremely variable.

Further, the greater weight of the pulley acts as a flywheel and helps to smooth out fluctuations in the speed.

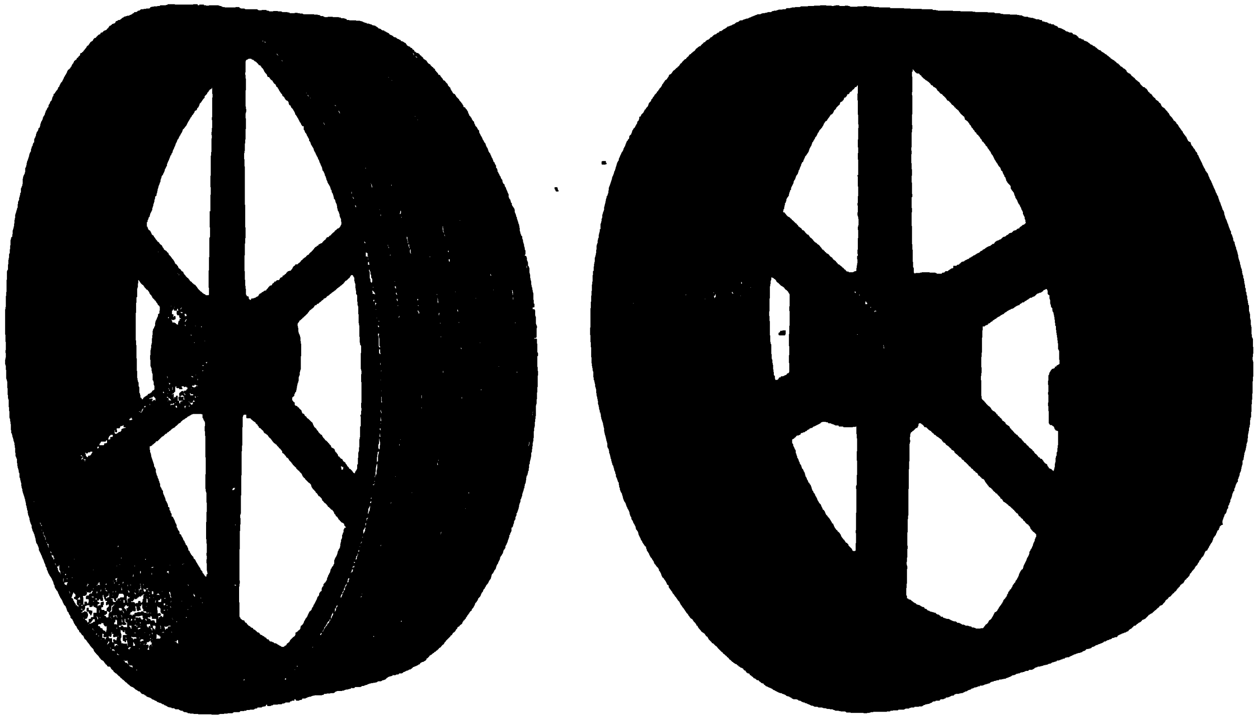
We manufacture Wrought and Cast-Iron Pulleys made to standard designs, from 12 ins. diam., either split or solid and fast or loose.

For prices see page 234.

Cast-Iron Rope Driving Pulleys.

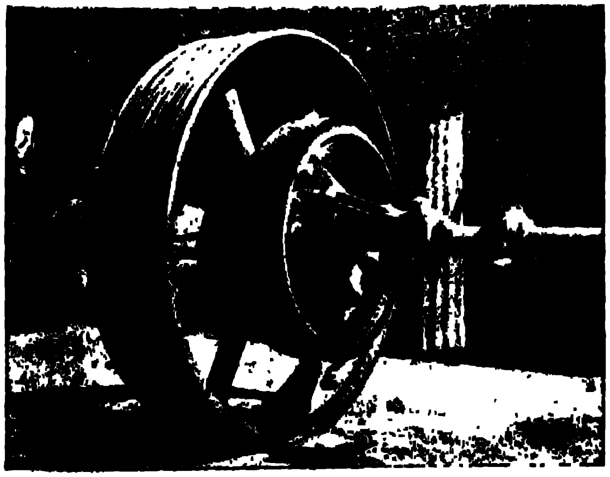
Bored, Key-Seated and Grooves Turned.

Split or Solid.



Rope Pulleys, either split or solid as required, and from 12 ins. diam. for ¾ in. to 2 ins. diam. ropes, are cast and machined with the greatest care. The question of balance and the trueness of the grooves necessitates a high degree of accurate workmanship.

We have manufactured Rope Pulleys with grooves for 33 ropes and up to 16 feet diameter.



Friction Clutch combined with Rope Pulley.

The use of the Friction Clutch and Rope Pulley presents many advantages over the use of flat belts with loose pulleys, especially in taking the drive from Oil Engines.

For prices see page 234.

W.-I. Split Pulleys—Single Arm.

Round or Flat Face.

Diameter of Pulley. Inches.	Width of Face in Inches. 4		6		8		9		10		12	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.
12	18	0	20	0	24	0	26	0	29	0	35	0
14	19	0	21	0	25	0	27	0	30	0	36	0
16	20	0	24	0	26	0	29	0	31	0	38	0
18	23	0	26	0	30	0	32	0	35	0	39	0
20	25	0	30	0	32	0	34	0	36	0	41	0
22	26	0	31	0	35	0	37	0	39	0	44	0
24	30	0	34	0	37	0	40	0	42	0	45	0
30	38	0	40	0	46	0	49	0	51	0	55	0
36	44	0	47	0	54	0	56	0	58	0	65	0
42	54	0	59	0	65	0	69	0	71	0	80	0
48	67	0	72	0	79	0	81	0	85	0	94	0

Prices for other sizes and Pulleys with Double, Treble or four Rows of arms on application.

Solid Cast-Iron Pulleys.

Round or Flat Face.

Diameter of Pulley. Inches.	Width of Face in Inches. under 4		4		5		6		7		8		9		10		11		12		13		14		15		16	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A	Rs.	A	Rs.	A	Rs	A
6	9	12	11	4	12	0	12	12	13	8	15	0	..		..		..		..		..		..		..		..	
8	..		12	12	13	8	15	0	16	8	18	0	..		..		..		..		..		..		..		..	
10	..		15	0	17	4	18	0	20	4	21	0	22	8	..		..		..		..		..		..		..	
12	..		18	0	18	12	20	4	22	8	24	0	25	8	29	4	33	12	35	4	..		..		..		..	
14	..		20	4	21	0	22	8	26	4	27	0	29	4	32	4	36	0	41	4	..		..		..		..	
18	..		21	12	22	8	26	4	29	4	30	0	33	12	35	4	39	12	45	0	..		..		..		..	
16	..		24	12	26	4	29	4	33	12	35	4	37	8	41	4	45	0	48	12	..		..		..		..	
20	..		27	0	30	0	33	12	37	8	39	0	45	0	48	12	49	8	52	8	..		..		..		..	
22	..		29	4	33	0	37	8	44	4	45	0	48	0	52	8	56	4	58	8	..		..		..		..	
24	..		33	12	37	8	41	4	47	4	48	12	51	0	56	4	60	0	63	12	..		..		..		..	
30	44	0	46	8	51	0	56	4	60	0	63	12	72	0	78	12	80	4	..		112	8	..		..		..	
36	..		54	0	56	4	66	12	67	8	73	8	78	12	89	4	97	8	105	0	112	8	120	0	127	8	135	0
42	..		58	8	67	8	71	4	78	12	82	8	97	8	105	0	112	8	120	0	142	8	..		..		..	
48	..		66	0	80	4	82	8	97	9	105	0	116	4	127	8	142	8	157	8	170	4	186	0	198	0	210	0

Split Pulleys 15 per cent. extra. Prices for other sizes on application.

Cast-Iron Rope Pulleys.

Bored, Key-Seated and Grooves Turned.

Diameter of Pulley. Inches.	Number of Grooves for 1¼ in. Diameter Ropes. 2	4	6	8	10	12
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
48	228	345	460	575	686	800
60	286	429	575	715	858	1,001
72	343	514	686	858	1,029	1,201
84	400	600	800	1,001	1,201	1,401
96	460	686	915	1,144	1,373	1,602
108	514	772	1,029	1,287	1,544	1,802
120	575	858	1,144	1,430	1,716	2,002

Split Pulleys 15 per cent. extra. Prices for Pulleys of other diameters and number and sizes of Ropes on application.

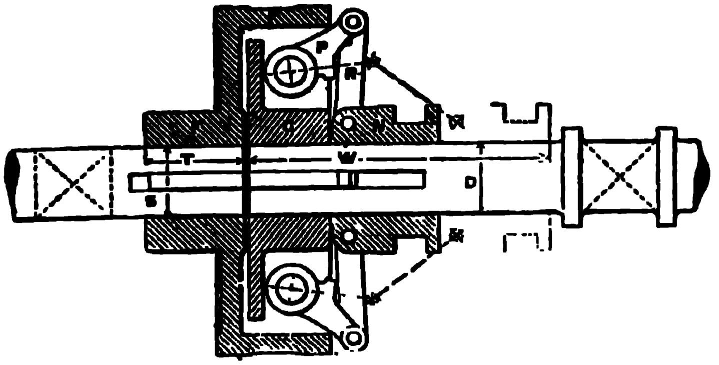
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

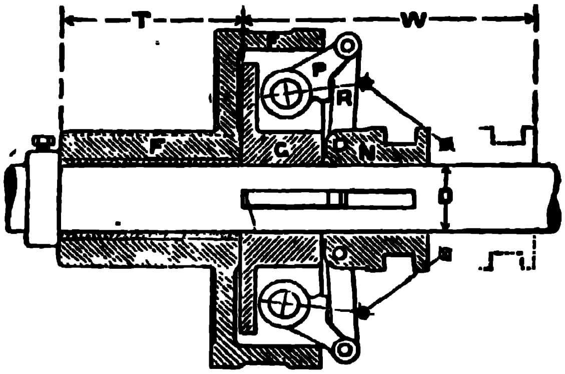
Friction Clutches.

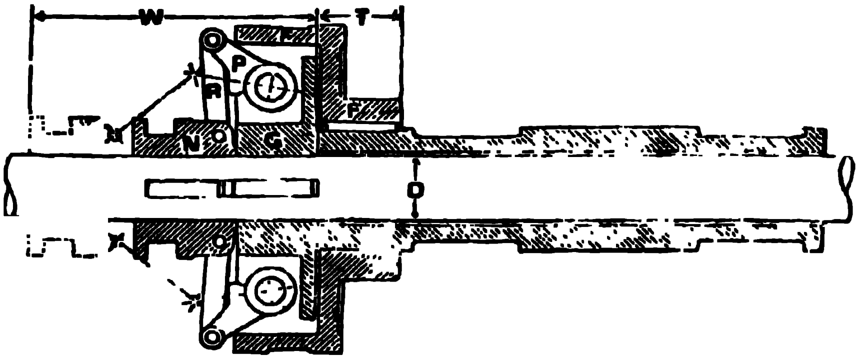
We illustrate below those of the many types of Friction Clutches manufactured in our Howrah Works, but shall be pleased to quote for any other type on receipt of the necessary particulars.



Type "A" is for connecting or disconnecting two separate shafts.

Type "B" for use in connection with Belt or Rope Pulleys, Gear Wheels, etc, erected on a continuous revolving shaft.





Type "C" is for a drive connected to a shaft which is constantly revolving, and where the Clutch is expected to be out of operation for other than very short periods.

In ordering a Friction Clutch affecting an existing installation it is not sufficient merely to state the horse-power and the speed. The type of machine to be driven and class of work to be operated upon has a very important bearing on the design of the clutch, and to enable us to offer the most suitable type we would particularly request customers to supply the following information:—

1. Maximum H.-P. to be transmitted. The power required to start the load from rest is often a serious item, and should on no account be underestimated.
2. Number of revolutions per minute.
3. Diameters of Shafts, Pulleys, etc.
4. Does the drive pass from pulley (or gear wheel) through clutch to shaft, or from shaft through clutch to pulley (or gear wheel)?
5. Space available on shafts and give particulars of surroundings.
6. How frequently will clutch be thrown in or out of gear?
7. What class of motive power drives clutch, *i.e.*, steam, gas or oil engine, electric motor, etc., or water power?
8. What is the class of machinery to be driven by clutch?
9. State approximately for what periods of time, if any, the clutch would remain disengaged, with driving portion revolving. A sketch or dimensioned drawing should be sent, showing position of clutch on shaft, and nearest bearings on each side; also position of shafts with relation to floor, wall or beams; and give thickness of walls or dimensions of beams, etc., so that we can advise as to operating gears, etc.

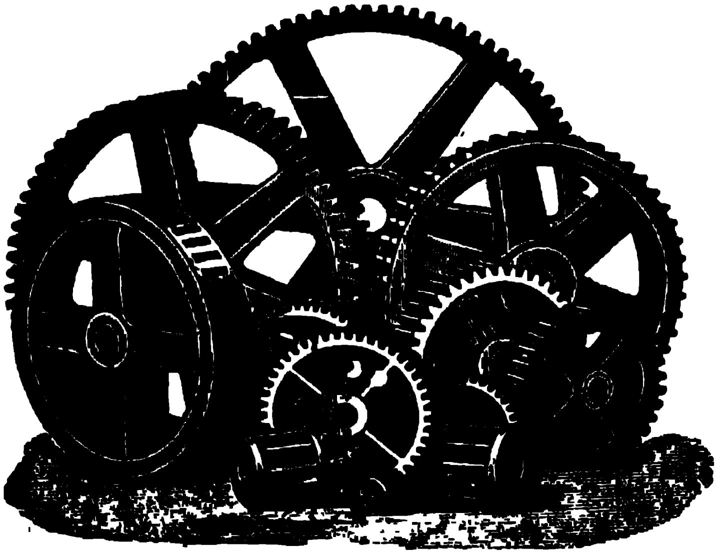
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

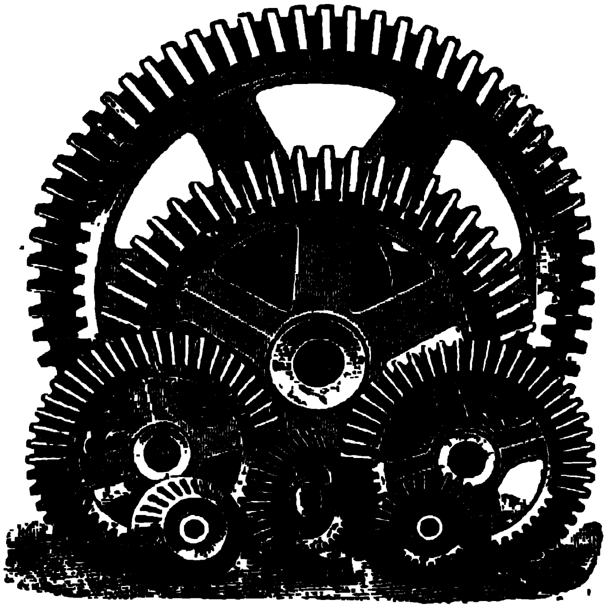
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Cast-Iron Gear Wheels.

Whole or in Halves.





All sizes of Spur, Bevel, Mortise, Plain and Shrouded Wheels made to order.

When ordering a wheel to replace one of an old pair, it is necessary that the number of teeth of the companion wheel should be given, and, if possible, an impression from the side of the teeth taken at the large end of the teeth.

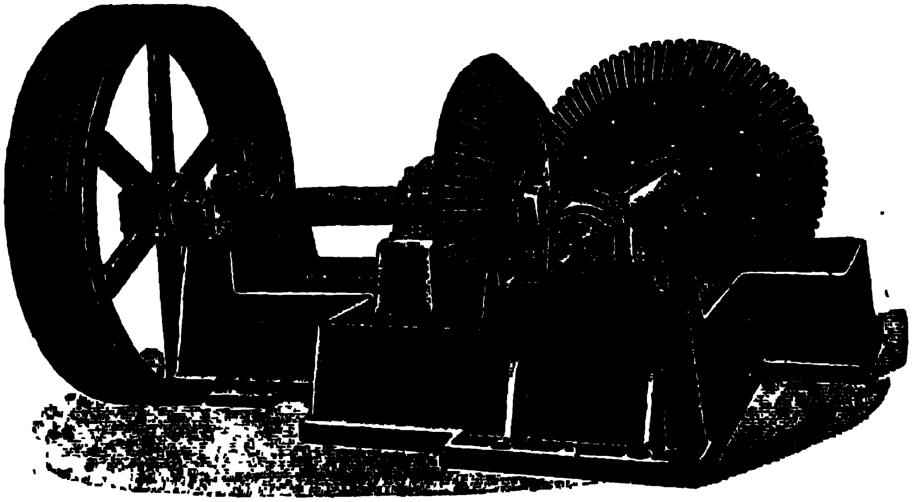
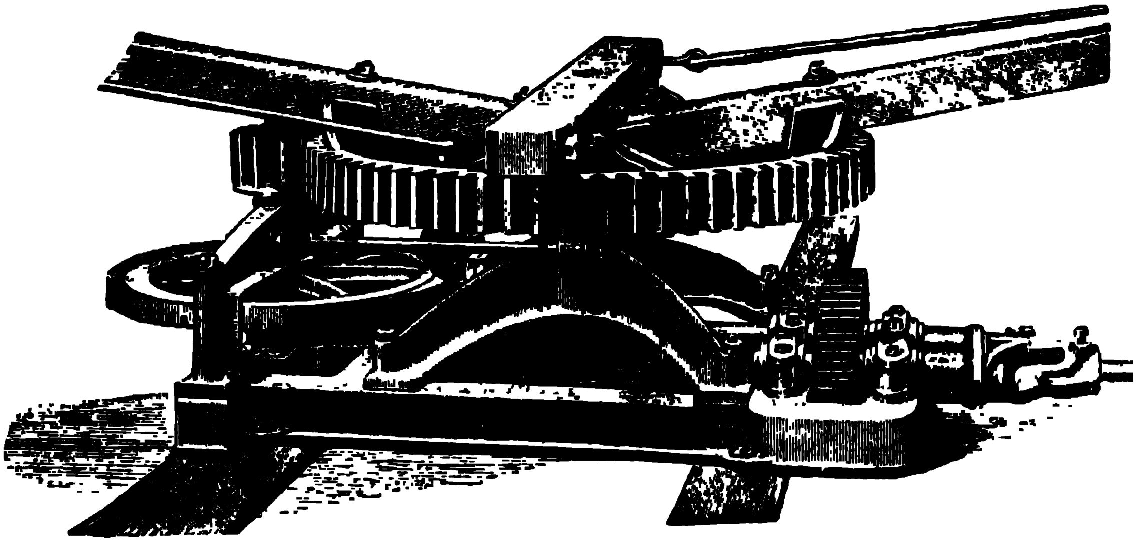


Illustration of Cast-Iron Framework forming an integral support for Bevel Gears, etc.

We manufacture fixings and supports for Gear Drives of every description.

Full particulars and prices on application.

The "Express" Triple-Speed Bullock Gear.



This Gear is specially suitable for driving machinery requiring high speed, such as Thrashing Machines, Grain Crushing and Grinding Mills, Pumps, Saw Benches, etc., etc. It requires no intermediate motion, and a Chaff Cutter or a Gram Crusher may be driven direct with a clutch, thus saving all cost of Pulleys, belting and fixing

Special attention has been paid in the construction with regard to strength, and it is so braced and supported in every way that it will stand almost any strain that two Bullocks can put upon it.

Triple-speed, 48, 66 or 80 Revolutions to one of the pole. The wheels to attain these speeds maintain the same centres, and can be changed at any time.

Prices.

Fitted complete with 2 wood poles, etc., spindle with end turned to 1½ inches and two Cast-Iron bearings .. .. **Rs. 550-0**

Pulley extra according to size.

The Gear can be fitted with tapered steel poles, if preferred, instead of wood.

Extra price on application.

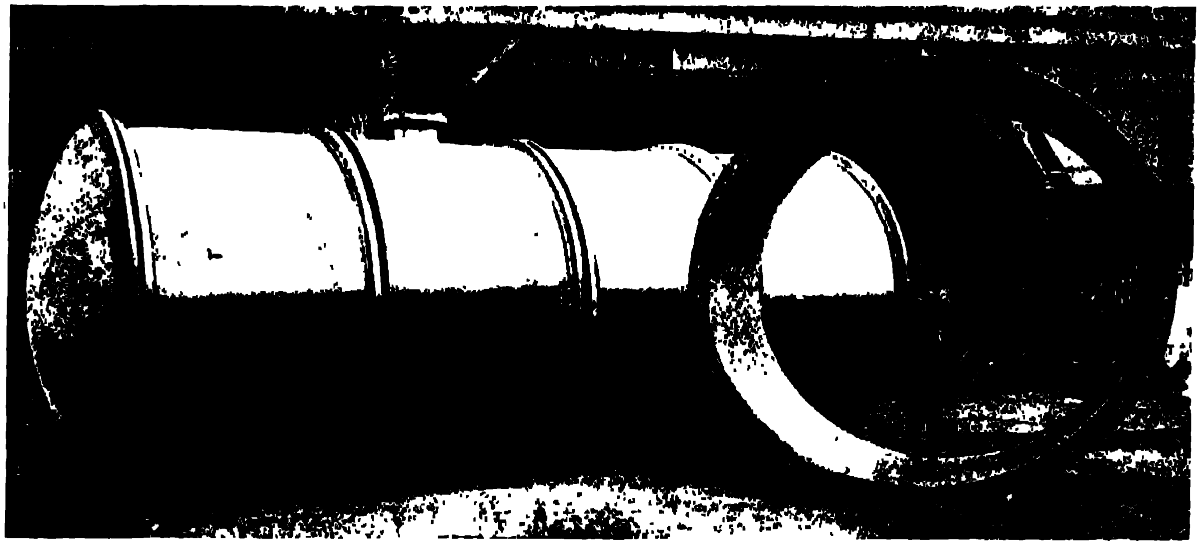
Descriptive list of parts with prices furnished to constituents.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

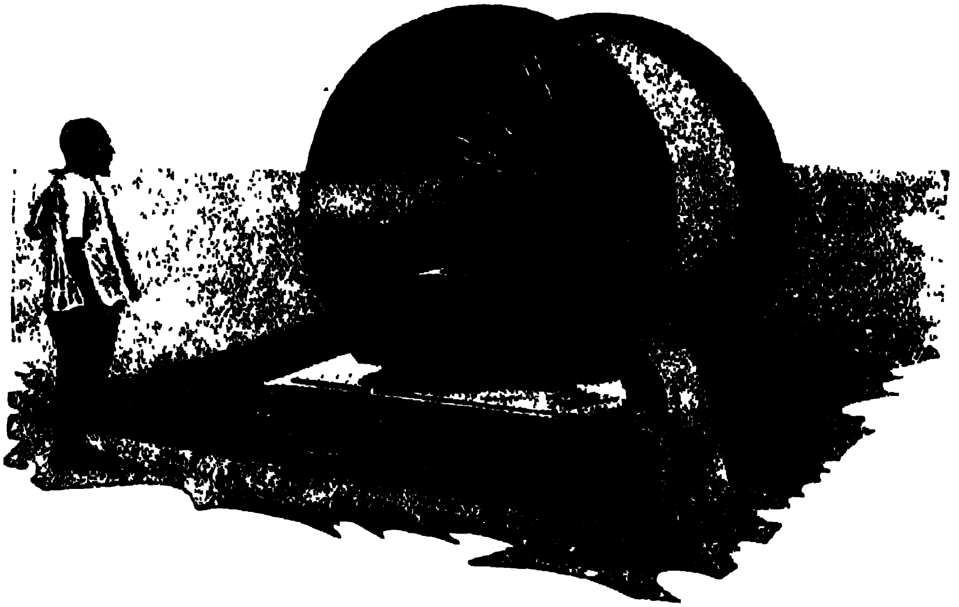
RANGOON, MADRAS,
BOMBAY, LONDON.

Heavy Castings.



A Lime Storage Tank.

One of a number of Cast-Iron Tanks manufactured by us for the Tata Iron and Steel Company. The illustration shows a section and a tank partly assembled. Diameter just over 9 feet. Made up of 5 rings, each weighing approximately 4½ tons and 2 dished ends, the whole weighing 25 tons



Machining a Cast-Iron Tank Section.

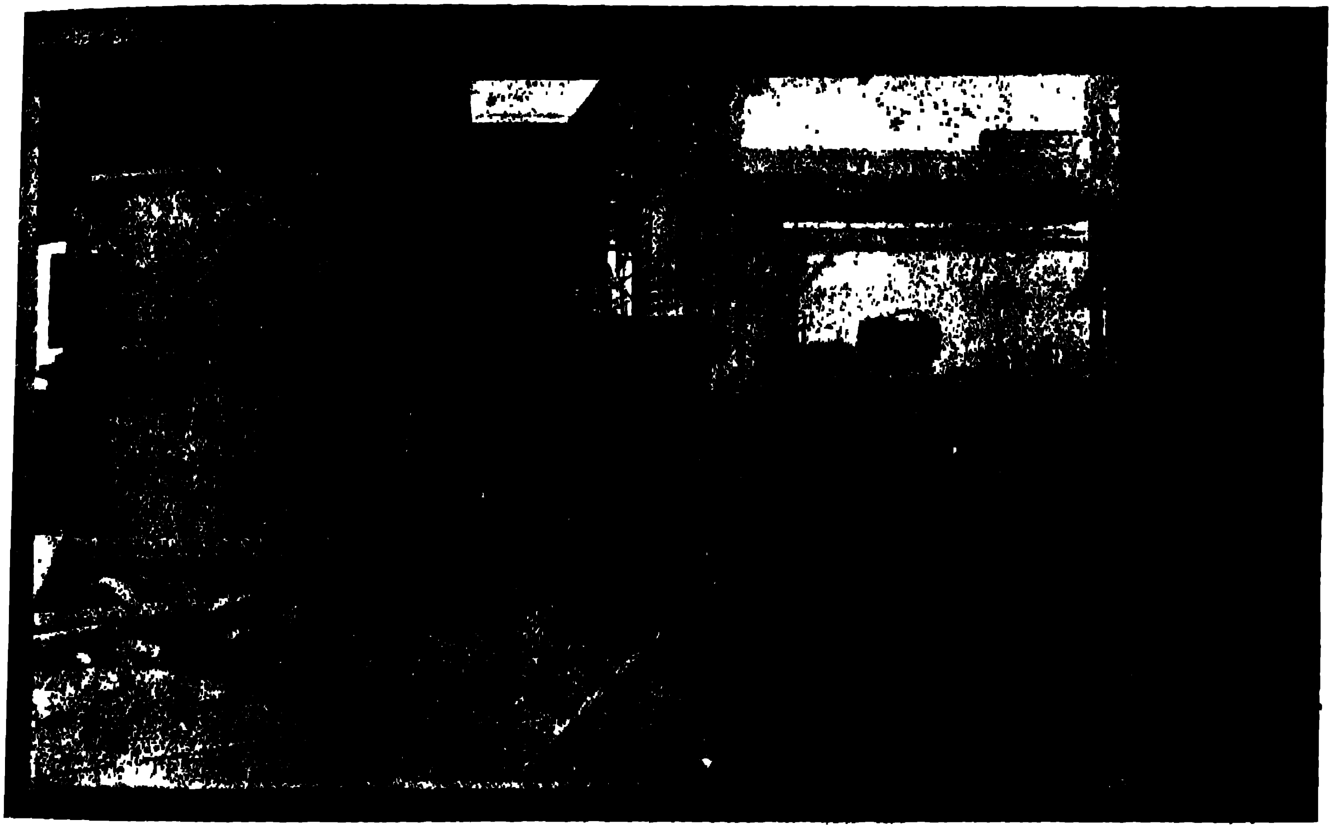
One of many sections of Acid Storage Tanks, similar to the above. The illustration is of section 8 feet diameter by 5 feet length and weighing approximately 5 tons.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

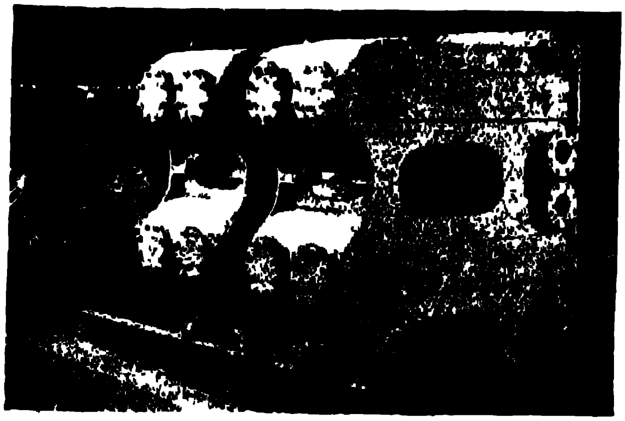
RANGOON, MADRAS,
BOMBAY, LONDON.

Heavy Castings.



Part of a Battery of Dephlegmators shown during manufacture.

In the foreground is shown part of a battery of Dephlegmators, one of many which were manufactured and erected by us for the Tata Iron and Steel Company.



Cast-Iron Casing of a Dephlegmator.

In the upper and lower castings are fitted 120 tubes. The approximate weight of each battery is 5 tons.

The Dephlegmators are part of the Bye-Product Recovery Plant used for Ammonia Distillation.

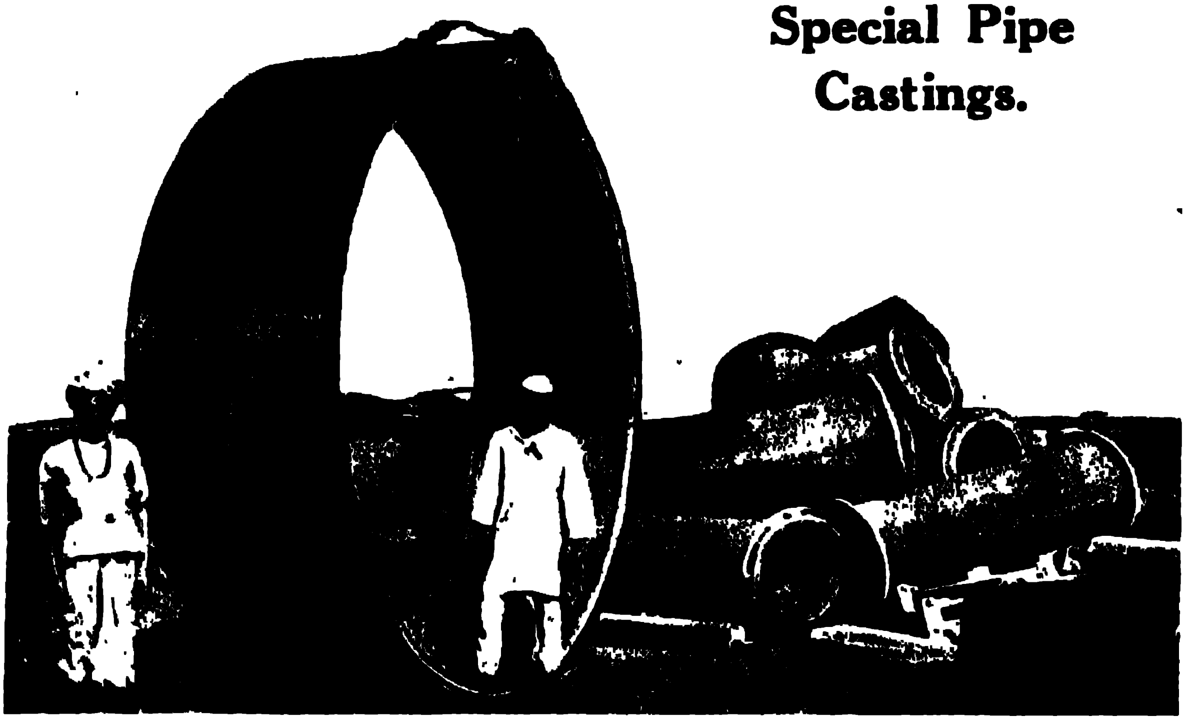
The background of the upper illustration shows part of our Assembly Department where all our machinery is erected and tested before despatch.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

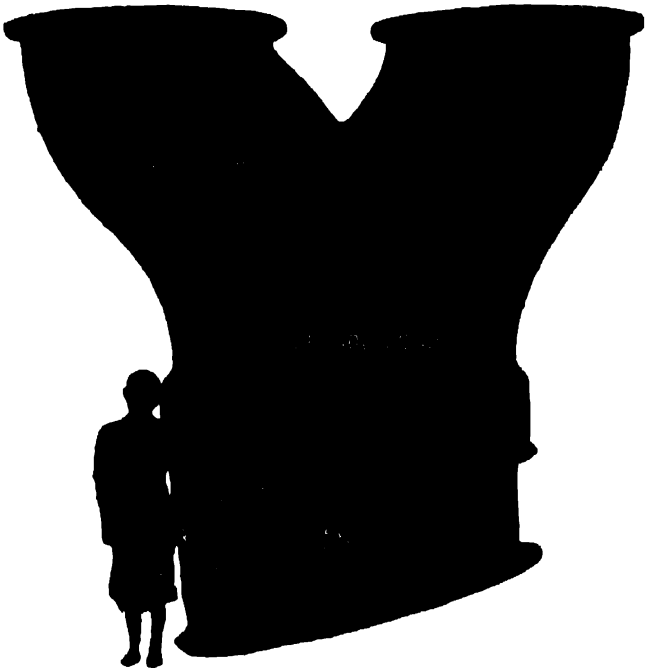
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Special Pipe Castings.



One of a number of 11 feet 6 inches diameter Caisson Rings and some 24 inches diameter pipes cast and layed by us for the Calcutta Electric Supply Corporation.



This illustration shows a " Y " (3-way) piece casting with a 60 inches bore main, two 45 inches bore branches and expansion piece, recently cast by us for the Bhatpara Power Station, and weighing approximately 6½ tons.

This special casting is attached, at the Power House end, to a riveted steel pipe line of over 1,000 feet long. The pipe line was also designed and layed by us.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

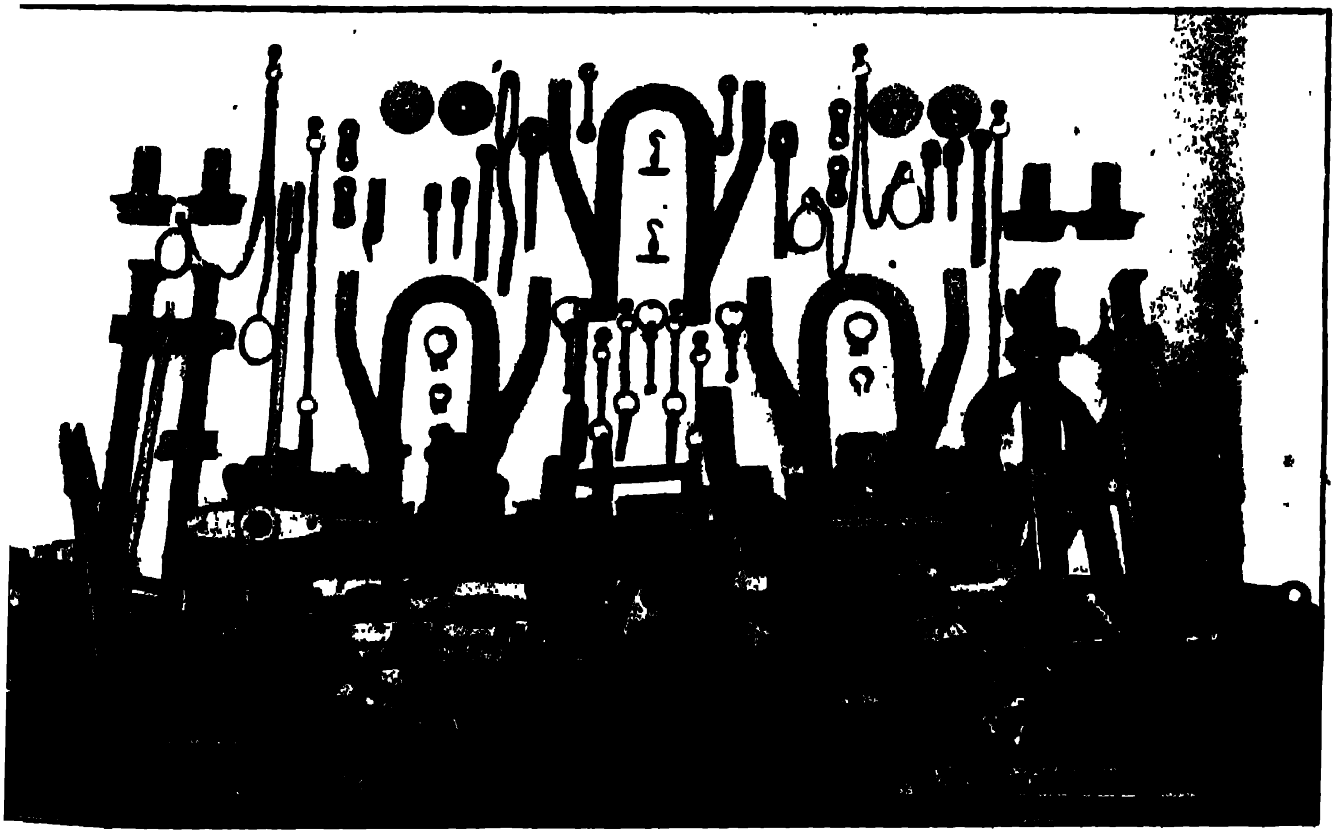
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Rolling Stock.

For Broad, Metre and Narrow Gauges.

Our Rolling Stock Works at Garden Reach are specially laid out for dealing with orders for Railway Rolling Stock. The works are equipped with the latest Labour-saving Tools and we can undertake to execute contracts at the rate of **100 Wagons a month.** We illustrate below different types of Forgings we have manufactured in these works for Railway Rolling Stock. On the following pages we show a few of the different types of wagons, of which we have constructed several thousands for the principal Indian Railways.



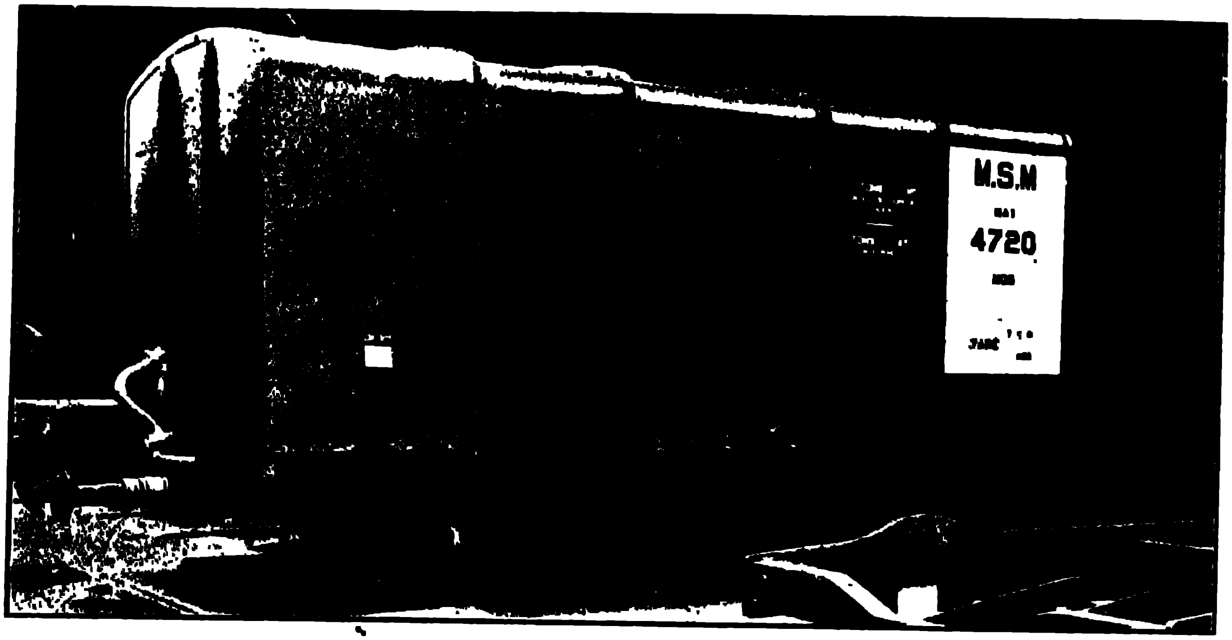
Railway Rolling Stock Forgings.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

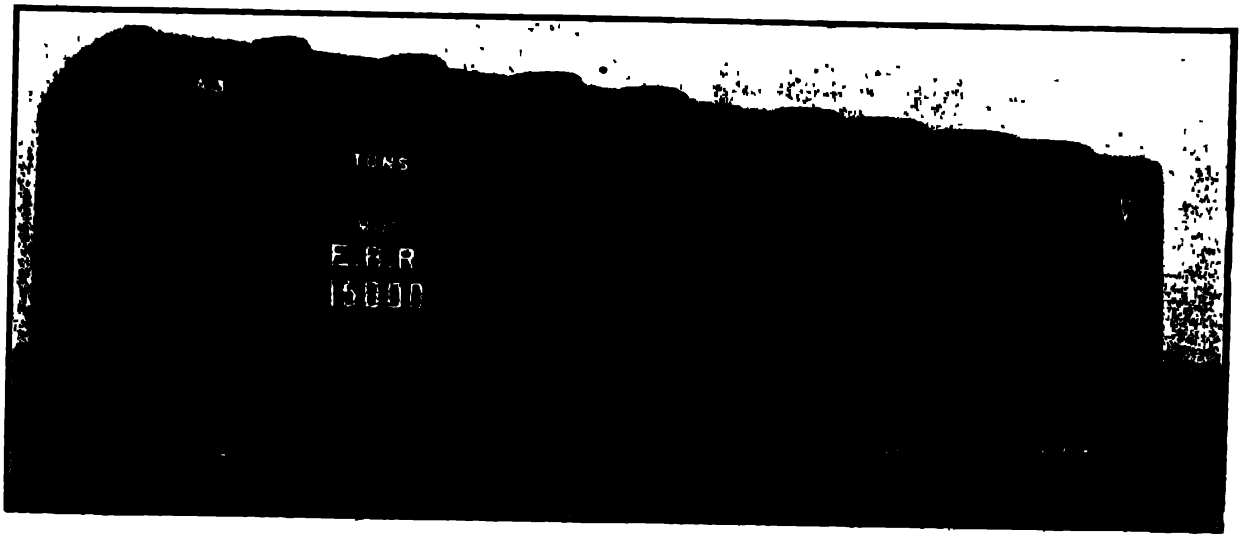
RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Rolling Stock.



Covered Goods Wagon, Metre Gauge, Type M.A. 1.

Manufactured to the order of the Railway Board for the M. and S. M. Railway.



Covered Goods Wagon, Broad Gauge, Type A 3.

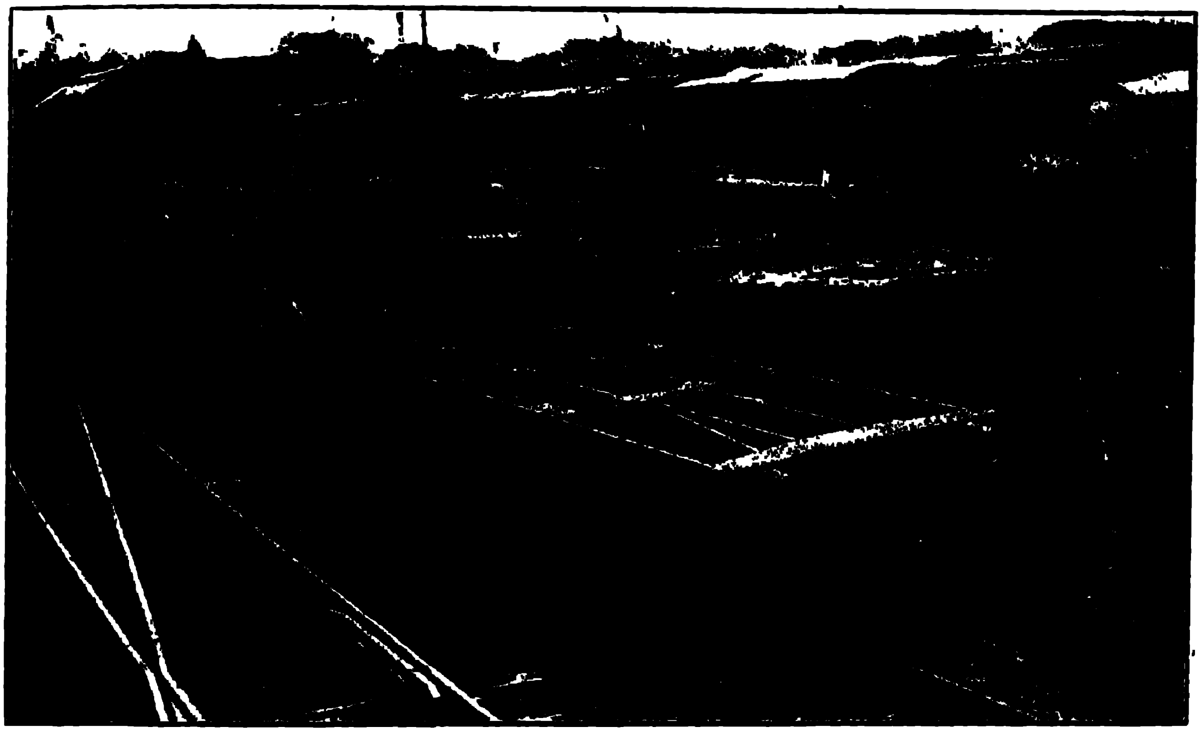
Manufactured for the E. B. Ry.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Rolling Stock.



60 feet Underframe for North-Western Railway Passenger Coach.

Low-sided Goods Trucks for the Dehri-Rohtas Light Railway.

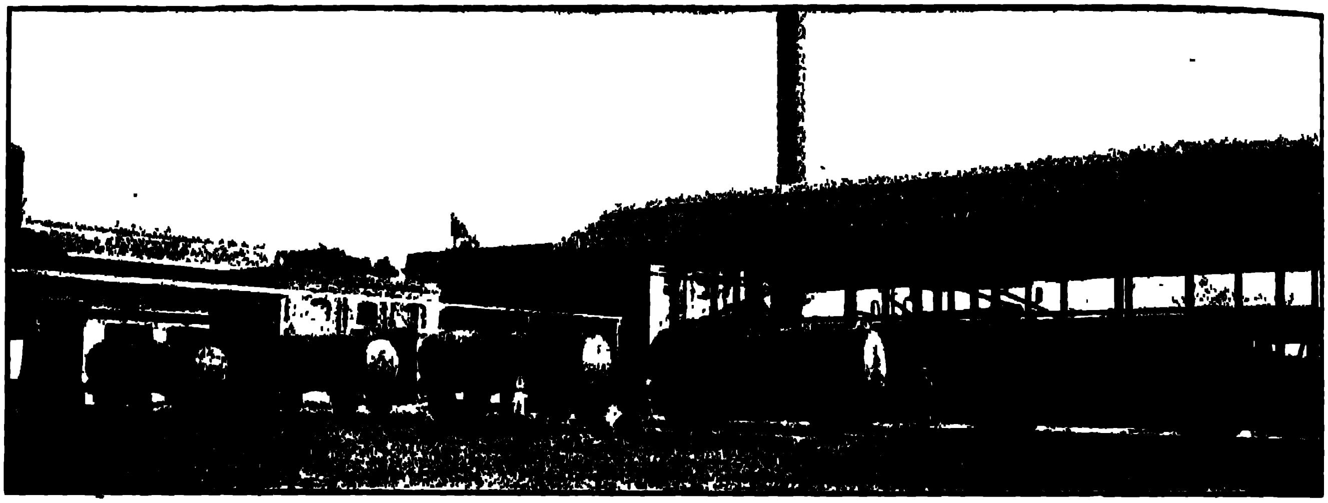
15 feet 10 inches long over buffers.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Rolling Stock.



Some of the 65 **Oil Tank Wagons** completed for the East Indian Railway. The tanks were manufactured in our Howrah Works and after being tested were fitted to underframes supplied by the Railway company.

Broad Gauge Covered Goods Wagons for the North-Western Railway and Oudh and Rohilkhand Railway.

23 feet 8 inches long over buffers.

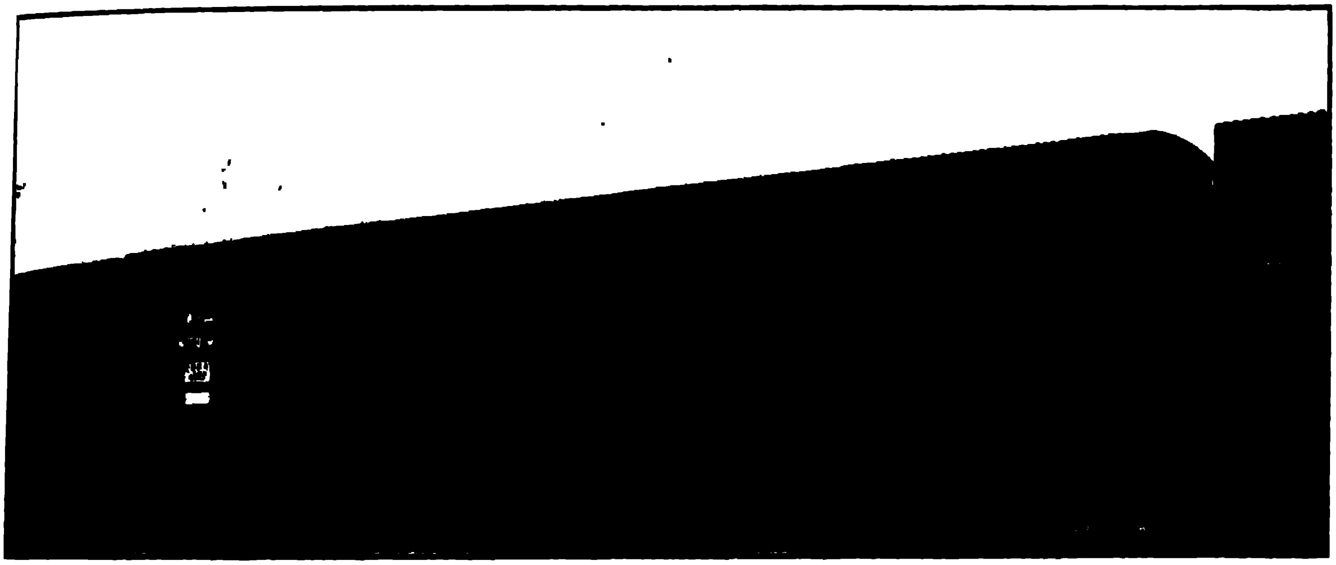
A train of **Covered Goods Wagons** of a type of which we have supplied large numbers in the past few years to orders from the Indian Railways.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

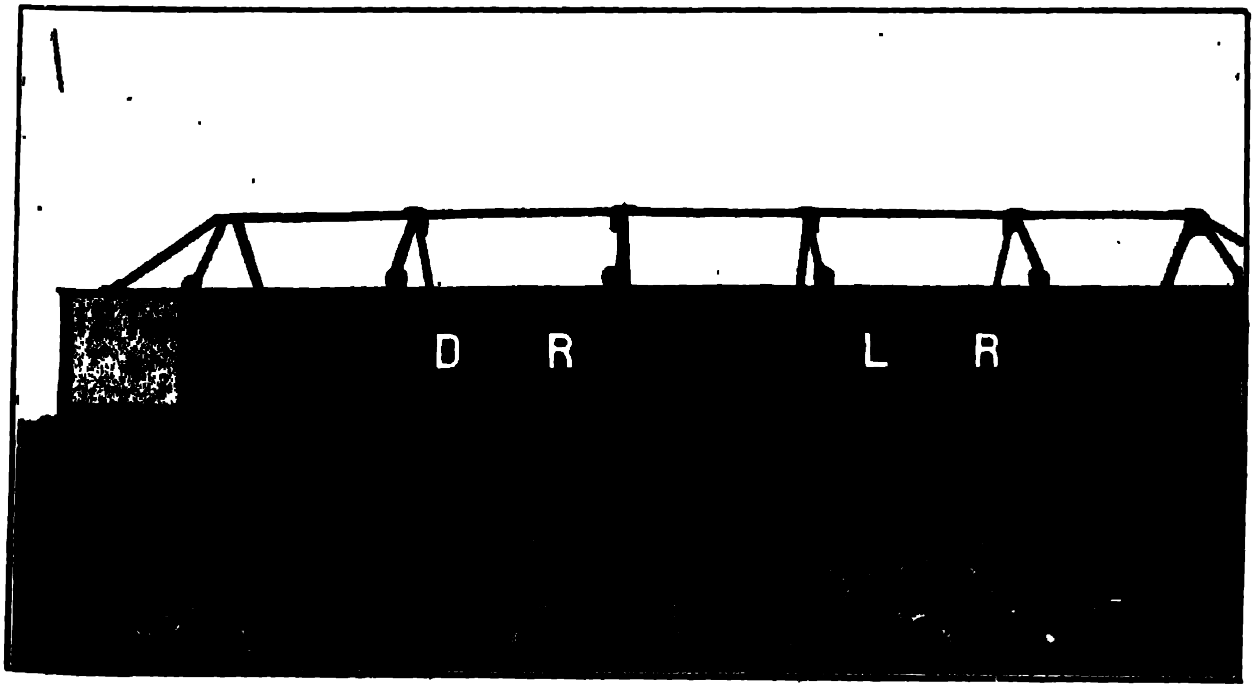
JESSOP & Co. LTD
ENGINEERS.

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Rolling Stock.



Metre Gauge Bogie Wagons for the Eastern Bengal Railway.
45 feet 6 inches long over buffers.
Fitted with Pressed Steel Underframes and Pressed Steel Doors.



Bogie Coal Wagons for the Dehri-Rohtas Light Railway.
29 feet 8 inches long over buffers.

Fitted with additional framework to carry tarpaulin covers in cases where perishable goods have to be carried.

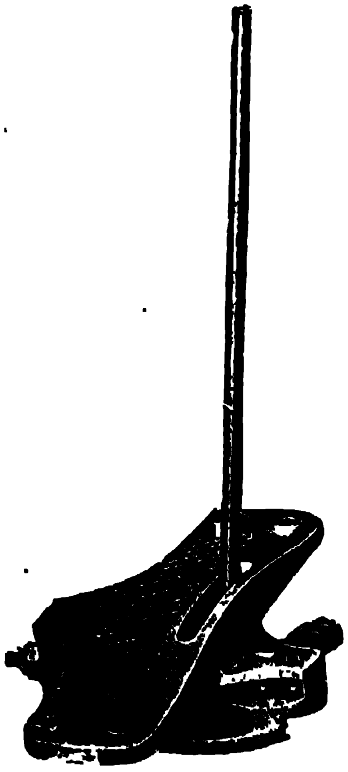
CALCUTTA, JAMSHEDPUR,
DELHI LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Automatic Spring Shunting Levers.

Hugh A. Thomson's Patent.



No. 2 Pattern.

No. 2 Pattern with Spring Adjusting Screw.

This is a **Two-Way Reversible Lever** that is an effectual remedy for **Derailment** or **Splitting the Points.**

A train, trailing through the numerous points of a gathering line for sidings, sets for itself with these levers a clear return through the same points.

The chief features of these levers are—**Spring Cushioned Action—Easily Fixed in Position—Low Maintenance Cost—suitable for any throw of the Blades—no loose and few wearing parts.**

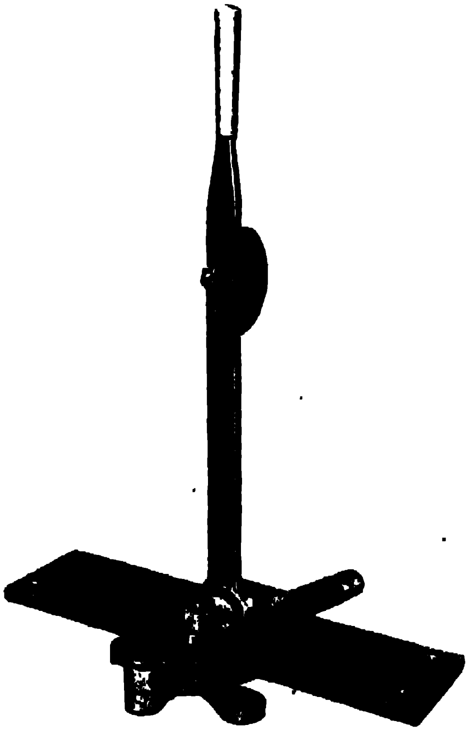
An efficient lever, reliable and positive in action.

Price, Rs. 95-0 each.

All-Steel Centreless Pattern.

100 per cent. Security.

Two-Way Reversing Lever with Safety Handle.



This Lever is made of steel throughout, and the actuating parts are arranged to give the simplest and strongest combination.

The differentiating feature of this lever, which in comparison with all other arrangements renders it unique, is the fact that the mechanism **cannot assume a dead centre position.** Hence the impossibility for the points to be left partly open.

Simple to fix, and all working parts are easily accessible.

The Spring is adjustable to regulate the pressure on the points.

Price, Rs. 115-0 each.

Prices and particulars of other types of Levers on application.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

PIRELLI TYRES

The abnormal speed of present day motor car racing created the need for a tyre capable of withstanding the enormous strain of constant braking, skidding round hairpin bends and rapid acceleration for mile after mile and hour after hour. Pirelli supplied that need by producing their new *Cord Tyres* and the results are seen in the records of Motor Racing Achievements for 1921-22. During these two years practically every international motor race of importance has been won on Pirelli Cords. At Brooklands, The Isle of Man, Strasbourg, Milan, besides numerous trials and hill-climbs, Pirelli unquestionably predominated.

The Pirelli Company have increased their manufacturing facilities and by means of increased production these tyres are now available to the motoring public in exactly the same quality as those upon which the abovementioned success was achieved.

Special Features.

The Casings.—The construction of Cord Tyres is entirely different from that of Canvas Tyres. Cotton is the basis of all Pneumatic Tyre casings, and the cotton used in the manufacture of Pirelli Cords is Egyptian throughout, and is spun in their own mills by special plant laid down for the purpose.

The Rubber.—The rubber used in the manufacture of Pirelli Cord Tyres is the same as that used for the various Motor Car Races during 1921-22. The great feature of this black rubber is its freedom from cuts and immense wear resisting properties.

Beads.—This is one of the most important points in the construction of Cord Tyres of the beaded edge type. Considerable attention has been given to this matter and the beads of Pirelli Cords have been specially strengthened and are built to ensure proper security on the rim.

Tread Design.—The illustration on the following page shows the distinctive pattern of the tread of Pirelli Cords. This tread has been designed to ensure uniform wear and hold the road under the most trying surface conditions.

Air Capacity.—The air capacity of Pirelli Cords exceeds that of oversize Canvas Tyres. Their use means more comfortable running and much greater resiliency.

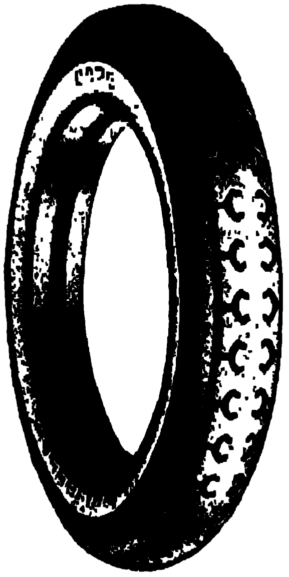
Some Victories on Pirelli Tyres.

The Targa Florio (270 miles)	**1st in 1919-20-21 and 22**
The French Grand Prix (500 miles)	**2nd and 3rd in 1921** **1st, 2nd and 3rd in 1922**
The French Light Car Grand Prix	**1st, 2nd and 3rd in 1921**
The Italian Grand Prix—1,500c.c. Class (375 miles)	**1st and 2nd in 1921** **1st, 2nd, 3rd and 4th in 1922**
The Italian Grand Prix—2 Litre Class (497 miles)	**1st, 2nd and 3rd in 1922**
The International Tourist Trophy (302 miles) ..	**2nd, 4th and 5th in 1922**
The Brooklands 200 Miles Race—1,100c.c. Class	**1st, 2nd and 3rd in 1921** **1st, 2nd and 3rd in 1922**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

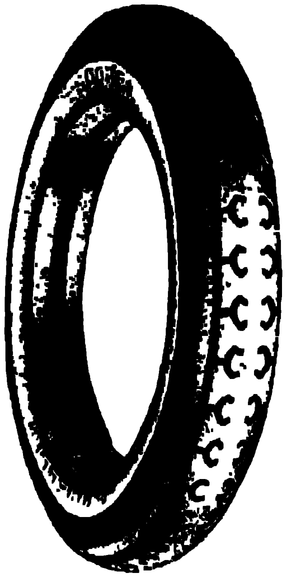
RANGOON, MADRAS,
BOMBAY, LONDON.



Beaded Edge Cord Tyre.

Retail Price List
of
PIRELLI TYRES.

Bona-fide **Motor Traders should write for particulars of Discounts and Contract Rates.**



Beaded Edge Cord Tyre.

Size.	Beaded Edge		Straight Sided		Tubes.	
	Rs.	As.	Rs.	As.	Rs.	As.
700×80	41	4	..		8	8
710×90	53	0	..		9	7
760×90	61	12	..		10	2
810×90	66	12			10	13
765×105	71	4	..		10	2
815×105	77	0	.		13	5
875×105	83	8			14	12
820×120	102	0			16	2
880×120	110	8	..		16	13
895×135	138	12	...		18	10
935×135	145	8	...		20	0
30×3½	50	8	59	8	9	5
32×3½	70	8	79	4	11	3
31×4	65	4	80	8	10	2
32×4	..		84	4	13	5
33×4	....		88	0	14	3
32×4½	....		98	12	16	2
33×4½	..		103	4	16	13
34×4½	...		107	8	16	13
33×5	....		139	8	18	10
34×5	....		145	4	20	0
35×5	....		147	0	20	0
36×6	....		226	12	29	0

Low Pressure "Superflex" Balloon Covers 31×4.40, for 30×3½ Rims. Rs. 50-12-0 each; Inner Tubes Rs. 10-2-0 each.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

Pirelli Solid Rubber Tyres.

For

Motor Lorries and Steam Wagons.

Single and Twin Tyres.

British Standard Millimetre Sizes.

Section of Tyre.	Fitting British Standard Wheel Rim. Dia-meters.	Description of Tyre in Form Re-commended by Engineering Standard Committee.	Prices.		Old Nominal Des-cription.
mm.	mm.		Rs.	As.	
85	720	85 for 720	143	0	850× 85
	670	90 „ 670	143	0	810× 90
	720	90 „ 720	147	12	860× 90
100	670	100 670	166	0	820×100
	720	100 720	170	4	870×100
	771	100 771	180	8	920×100
	850	100 850	196	4	1000×100
	720	110 720	197	0	870×110
	771	110 771	208	12	....
120	670	120 670	211	0	830×120
	720	120 720	224	4	880×120
	741	120 741	229	8	900×120
	771	120 771	238	0	930×120
	850	120 850	259	8	1010×120
	881	120 881	268	0	1050×120
130	720	130 for 720	254	0	880×130
	850	130 „ 850	297	4	1020×130
	881	130 „ 881	307	8	1050×130
140	670	140 670	251	12	830×140
	720	140 720	268	12	880×140
	771	140 771	287	0	930×140
	850	140 850	309	12	1030×140
	881	140 881	340	12	1060×140
160	670	160 „ 670	339	4	840×160
	720	160 „ 720	360	8	900×160
	771	160 „ 771	383	8	970×160
	850	160 „ 850	418	8	1030×160

Non-Standard Millimetre Sizes.

Section of Tyre.	Fitting Wheels of Rim. Diameters.	Prices.		Old Nominal Description.
mm.	mm.	Rs.	As.	
75	686/7	139	0	810× 75
90	620/1	136	4	760× 90
	686/7	150	8	830× 90
	755	162	8	900× 90
100	621	162	8	770×100
	700/1	174	8	850×100
	750/1	184	4	900×100
	755	184	12	910×100
110	751	206	12	900×110
120	660/1	203	0	820×120
	690/1	212	4	850×120
	700/1	218	8	860×120
	751	235	12	910×120
	900	272	4	1060×120
140	680/1	282	12	850×140
	870	337	4	1050×140
160	870	424	0	1070×160

Inch Sizes.

(Interchangeable with American S. A. E. Standard Sizes.)

Section of Tyre.	Fitting Wheels of British Standard Rim. Diameters.	British Standard Designation of Tyres.	Prices.	
Ins.	Ins.	Ins.	Rs.	As.
3	26	32×3	140	8
3½	26	32×3½	170	0
	28	34×3½	179	12
	30	36×3½	190	0
4	26	32×4	192	8
	28	34×4	202	8
	30	36×4	215	0
5	28	34×5	280	0
	30	36×5	298	12
	34	40×5	323	0
6	30	36×6	368	0
	34	40×6	385	0

Pirelli Solid Rubber Tyres.

Fitting Pressures.—Below are given the minimum and maximum pressures to be applied when fitting Pirelli Solid Tyres. It must be understood that the pressures necessarily vary according to the surfaces of the wheels and tyre bands. The minimum pressure represents the lowest pressure that will result in a safe grip and the maximum the pressure that must not be exceeded if the risk of a burst band is to be avoided. We accept no responsibility for the accuracy of these figures, and give them merely as a guide to those persons fitting tyres.

Section.	75	85/90	100/110	120/130	140/180	m/m.
Minimum Pressure ...	8	9	10½	13	16	Tons.
Maximum Pressure ..	13	15	18	21	27	„

These pressures are for tyres of British Standard Dimensions being fitted to wheels of British Standard Dimension.

Fitting.—We will remove old tyres and fit Pirelli Solid Tyres free of charge at all our Branches but such free service is strictly limited to the fitting operations. Additional work, such as the removal of wheels, or their replacement, the fitting of flanges, etc., must be paid for, and will be charged at cost.

When Buyers desire the fitting to be done elsewhere it must be arranged and paid for by them, and in such cases we will make an allowance from the invoice price of the tyre towards the cost of pressing off each old tyre and pressing on each new tyre as follows:—Sizes up to and including 100 m|m section, **Rs. 3** each operation; sizes 110 m|m and larger, **Rs. 4** each operation

We accept no liability for damage to customers' wheels whilst in our charge, but every care will be exercised in the handling of same.

Terms of Sale for Pneumatic and Solid Tyres.

Guarantee.—Pirelli Pneumatic and Solid Tyres are made from the very finest materials that can be obtained, by the most skilled labour, but owing to the nature of the component parts employed and to the inability of the Manufacturers to exercise any control over the manner in which the tyres are used, neither the Manufacturers nor their Agents are able to give any guarantee whatever No responsibility can, therefore, be accepted for any defects in the tyres or for accidents of any kind arising therefrom.

Sizes.—The sizes by which Pirelli Covers and Tubes are designated are merely nominal, and are sizes generally recognised in the Motor Trade.

Prices.—All tyres are invoiced at prices current at time of delivery, irrespective of date of order.

Delivery.—The prices quoted in the preceding lists are for delivery ex our Godowns in Calcutta, Delhi, Madras or Rangoon. Packing and Freight are charged extra. All Pneumatic tyres are despatched by passenger train and Solid tyres by goods train unless instructions are received to the contrary. When delivery has been accepted, it is understood that all the above Terms of Sale are agreed to by the buyer.

The preceding Price Lists do not constitute an offer, and we reserve to ourselves the right to refuse or accept any order submitted.

Prices are always subject to alteration without notice.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

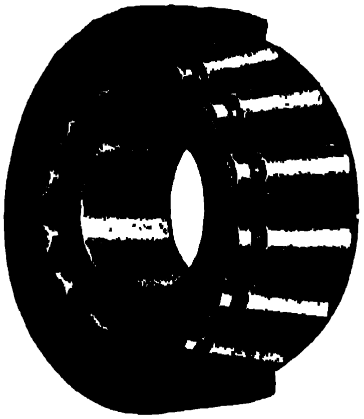
RANGOON, MADRAS,
BOMBAY, LONDON.

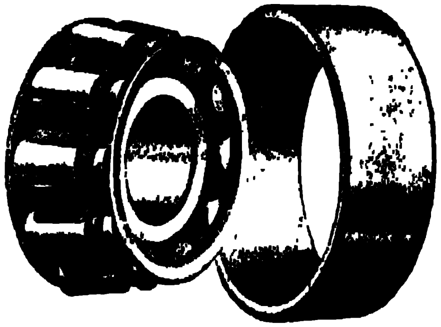
Timken Tapered Roller Bearings

For

Motor Cars and Lorries

By British Timken Limited.





Timken Bearings are now in use on over 300 different makes of Cars and Lorries, including

A. C.
Albert
Berliet
Buick
Chandler
Chevrolet
Crossley
Daimler
Darracq
Deemster
Dodge
Essex
Ford
Halley's
Hudson
Humber
Hupmobile
Leyland
Maxwell
Napier
Overland
Paige
Rover
Singer
Swift
Studebaker
Tilling Stevens
Vauxhall
Willy's Knight
Wolseley.

Timken Roller Bearings.

Millimetre Sizes. Short Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price. Rs.	Price. As	Bearing Cone.	No. Cup.
		m/m.	m/m.	m/m.	m/m.	Rs.	As		
157	153	20	52	15	15	24	12	157	153
246	243	22	62	17	17			246	243
247	243	25	62	17	17	28	0	247	243
247S	243	28	62	17	17			247S	243
259	253	35	72	17	17	28	15	259	253
277	274	40	80	18	18	34	10	277	274
305	303	20	72	19	19	29	5	305	303
308	303X	25	65	19	19	28	0	308	303X
318	314	25	80	21	21	31	14	318	314
319	313	30	72	19	19	30	10	319	313
319	323	30	75	19	19	30	15	319	323
(formerly								(formerly	
329	323)							329	323)
339	333	35	80	21	21	34	13	339	333
344	333	40	80	21	21	34	8	344	333
339	332	35	85	21	21	36	13	339	332
(formerly								(formerly	
349	332)							349	332)
357	353	40	90	23	23	39	11	357	353
358	354	45	85	19	19	37	6	358	354
365	363	50	90	20	20	40	1	365	363
366	363	50	90	20	20			366	363
367	363	45	90	20	20	39	6	367	363
(formerly								(formerly	
360	363)							360	363)
376	373	45	100	25	25	44	10	376	373
385	383	55	100	21	21	43	0	385	383
397	394	60	110	22	22	55	0	397	394
416	413	30	90	23	23	41	15	416	413
420	413	40	90	23	23	41	10	420	413
435S	434	45	100	25	25	48	2	435S	434
(formerly								(formerly	
446	434)							446	434)
441	434	35	100	25	25	47	8	441	434
459	454	40	110	27	27	55	0	459	454
465	454	50	110	27	27	53	6	465	454
(formerly								(formerly	
469	454)							469	454)
475	473	55	120	29	29	68	15	475	473
476	474	60	130	31	31	74	14	476	474
476	473	60	120	92	29	68	0	476	473

English Sizes. Short Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price. Rs.	Price. As	Bearing Cone.	No. Cup.
		Ins.	Ins.	Ins.	Ins.				
235	2320	·9375	2·2400	·8125	[illegible]	27	11	235	2320
236	2320	1·0000	2·2400	·8125	[illegible]			236	2320
0247	0243	1·0000	2·5000	·7500	¾	28	0	0247	0243
255	2520	1·2500	2·6150	·8125	[illegible]	29	5	255	2520
256	2520	1·3125	2·6150	·8125	[illegible]	28	15	256	2520
256	2530	1·3125	2·6150	·8125	[illegible]	29	5	256	2530
257	2520	1·1875	2·6150	·8125	[illegible]	26	6	257	2520
258	2520	1·0625	2·6150	·8125	[illegible]	29	9	258	2520
0259	0253	1·2500	2·7500	·6875	[illegible]	29	5	0259	0253
275	2720	1·3750	3·0000	·7500	[illegible]	28	15	275	2720
0275	0273	1·3750	3·0000	·6875	[illegible]	33	8	0275	0273
276	2720	1·5625	3·0000	·7500	[illegible]	28	15	276	2720
278	2720	1·3750	3·0000	·7500	[illegible]			278	2720

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Timken Roller Bearings.

English Sizes. Short Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price.		Bearing Cone.	No. Cup.
		Ins.	Ins.	Ins.	Ins.	Rs.	As.		
286	284	1·5625	3·1562	·6250	25/32	29	15	286	284
287	284	1·6250	3·1562	·6250	25/32			287	284
288	284	1·7500	3·1562	·6250	25/32			288	284
306	303	1·0000	2·8346	·7480	19 m/m.	28	5	306	303
315	312	1·0000	2·8593	·9375	1 1/16	31	3	315	312
316	312	1·1875	2·8593	·9375	1 1/16	31	9	316	312
317	312	1·3125	2·8593	·9375	1 1/16			317	312
317T	312	1·3125T	2·8593	·9375	1 1/16	31	3	317T	312
334	3320	1·1875	3·1562	·9375	1 1/16	36	2	334	3320
335	3320	1·3750	3·1562	·9375	1 1/16	35	12	335	3320
336	3320	1·6250	3·1562	·9375	1 1/16	35	8	336	3320
337	3320	1·5000	3·1562	·9375	1 1/16	35	12	337	3320
338	3320	1·0000	3·1562	·9375	1 1/16			338	3320
341	3320	·8750	3·1562	·9375	1 1/16	34	2	341	3320
342	3320	1·6250	3·1562	·9375	1 1/16			342	3320
343	3320	1·3750	3·1562	·9375	1 1/16			343	3320
347	3320	1·5000	3·1562	·9375	1 1/16			347	3320
348	3320	1·1811	3·1562	·9375	1 1/16	36	2	348	3320
355	3520	1·7500	3·3125	·5375	1 1/16	38	7	355	3520
356	3520	1·1875	3·3125	·9375	1 1/16	36	13	356	3520
359	3520	1·8125T	3·3125	·9375	1 1/16	37	12	359	3520
359S	3520	1·8125	3·3125	·9375	1 1/16	38	7	359S	3520
360	3520	1·3125T	3·3125	·9375	1 1/16	36	13	360	3520
375	3720	2·0000	3·6718	·9375	1 1/16	41	0	375	3720
375T	3720	2·0000T	3·6718	·9375	1 1/16			375T	3720
376	3720	1·7716	3·6718	·9375	1 1/8	41	10	376	3720
377	3720	2·0625	3·6718	·9375	1 1/16	41	0	377	3720
395	3920	2·5000	4·4375	·9375	1 1/16	50	12	395	3920
415	412	1·5000	3·2500	1·1875	1 3/8	41	10	415	412
415	412A	1·5000	3·2500	·9375	1 1/8	40	11	415	412A
415T	412	1·5000T	3·2500	1·1875	1 3/8	41	10	415T	412
415T	412A	1·5000T	3·2500	·9375	1 1/8	40	11	415T	412A
417	412	1·3750	3·2500	1·1875	1 3/8	43	4	417	412
418	412	1·5000	3·2500	1·1875	1 3/8	44	14	418	412
419	412	1·6250	3·2500	1·1875	1 3/8	43	0	419	412
419	412A	1·6250	3·2500	·9375	1 1/8	40	5	419	412A
421	414	1·3779	3·4843	·8750	1 1/16	42	5	421	114
422TV	414	1·5625T	3·4843	·8750	1 1/16	44	9	422TV	414
435	4320	1·7500	3·4843	1·3125	1½	46	8	435	4320
435T	4320	1·7500T	3·4843	1·3125	1½	50	12	435T	4320
435T	432	1·7500T	3·7500	·8750	1 1/16	44	14	435T	432
436	4320	1·8125	3·4843	1·3125	1½	50	12	436	4320
439	4320	1·6250	3·4843	1·3125	1½	48	13	439	4320
439T	432	1·6250T	3·7500	·8750	1 1/16	47	13	439T	432
440	4320	1·5000	3·4843	1·3125	1½	50	12	440	4320
443	4320	1·2500	3·4843	1·3125	1½			443	4320
444	4320	1·5000	3·4843	1·3125	1½			444	4320
445	4320	1·1250	3·4843	1·3125	1½			445	4320
447	4320	1·6250	3·4843	1·3125	1½	46	8	447	4320
449	4320	1·3730	3·4843	1·3125	1½	50	12	449	4320
455	4520	2·0000	3·9843	1·3125	1½	55	10	455	4520
456	4520	2·1250	3·9843	1·3125	1½	52	6	456	4520
458	4520	1·7500	3·9843	1·3125	1½	58	4	458	4520
458T	4520	1·7500T	3·9843	1·3125	1½			458T	4520
460	4520	1·7500	3·9843	1·3125	1½	53	6	460	4520
461	4520	1·6870	3·9843	1·3125	1½	58	4	461	4520
461T	454	1·6870T	4·3307	1·0630	1·063			461T	454
462	4520	2·2500	3·9843	1·3125	1½			462	4520
462T	454	2·2500T	4·3307	1·0630	1·063			462T	454

Timken Roller Bearings.

English Sizes. Short Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price.		Bearing Cone.	No Cup.
		Ins.	Ins.	Ins.	Ins.	Rs.	As.		
463	452	1·8750	4·2500	1·0630	1¼	57	4	463	452
477	473	2·5000	4·7244	1·1417	29 m/m.	68	11	477	473
537	532	2·0000	4·3750	1·3125	½	69	10	537	532
537E	532	2·0000	4·3750	1·3125	½	85	4	537E	532
539	532	2·1250	4·3750	1·3125	½	69	10	539	532
539E	532	2·1250	4·3750	1 3125	1½	85	4	539E	532
539T	532	2·1250T	4·3750	1·3125		69	10	539T	532
559	552	2·5000	4 8750	1·3125		83	10	559	552
559T	552	2·5000T	4·8750	1·3125	1½			559T	552
598	592	3·6250	6·6000	1·3125	1 9/16	87	14	598	592
717	713	3·2500	5·8750	1·6875	1 11/16	130	3	717	713
749	742	3·3475	5·9090	1·4375	1¾	110	10	749	742
759	752	3·5000	6·3750	1·5000	1⅞	135	11	759	752
779	772	3·8750	7·1250	1·5000	1⅞	164	5	779	772
780	772	4·0000	7·1250	1·5000	1⅞	159	2	780	772
782	772	4 1250	7·1250	1·5000	1⅞	165	0	782	772
861	852	4·0000	7·5000	1·8750	2¼	229	2	861	852
936	932	4·2500	8·3750	2·1250	2⅝	338	8	936	932
940	932	3·8750T	8·3750	2·1250	2⅝			940	932

English Sizes. Long Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price.		Bearing Cone.	No Cup.
1150	1130	·6250	1·7500	·6250	1 1/32	19	14	1150	1130
1351	1330	·7500	2·0000	·6250	15/16	20	8	1351	1330
1550	1520	·7500	1·8025	·6250	1 1/32	24	1	1550	1520
1750	1730	1·0000T	2·1250	·6250	15/16	21	13	1750	1730
1751	1730	·9375	2·1250	·6250	13/16	27	0	1751	1730
1752	1730	·9375	2·1250	·6250	61/64	23	12	1752	1730
1755	1730	·8750	2·1250	·6250	57/64	27	0	1755	1730
1950	1920	1·1250T	2·2400	·6250	1 1/32	23	6	1950	1920
1951	1920	1·2187T	2·2400	·6250	1 1/32			1951	1920
1953	1920	1·0000	2·2400	·6250	1 1/32	28	5	1953	1920
1954	1920	1·1250	2·2400	·6250	1 1/32	29	5	1954	1920
1985	1920	1·1250	2·2400	·6250	29/32	22	7	1985	1920
1986	1930	1·0000	2·2400	·6250	29/32			1986	1930
2380	2320	·8750	2·2400	·8125	15/16	25	6	2380	2320
2382	2320	1 0000	2 2400	·8125	15/16			2382	2320
2550	2520	1·3750T	2·6150	·8125	1 1/32	28	15	2550	2520
2553	2520	1·2500	2·6150	·8125	1 1/32			2553	2520
2650	2620	1·0000	2·4843	·7500	1 3/32	31	3	2650	2620
2687	2620	1·0000	2·4843	·7500	15/16	27	5	2687	2620
2690	2620	1·1562	2·4843	·7500	15/16			2690	2620
2750	2720	1·5000T	3·0000	·7500	1 3/16	31	14	2750	2720
2760	2720	1·5625	3·0000	·7500	1 3/16			2760	2720
2785	2720	1·3125	3·0000	·7500	15/16	29	15	2785	2720
2785	2729	1·3125	3 0000	·7500	15/16			2785	2729
2786	2720	1·3750	3·0000	·7500	15/16			2786	2720
3154	3120	1·1875	2·8593	·9375	1 3/16	25	12	3154	3120
3158	3120	1·2500	2·8593	·9375	1 11/32	35	12	3158	3120
3159	3120	1·3125	2·8593	·9375	1 11/32			3159	3120
3160	3120	1·1875	2·8593	·9375	1 11/32			3160	3120
3161	3120	1·2500	2·8593	·9375	1 3/16			3161	3120
3190	3120	1·1811	2·8593	·9375	1 3/16	33	14	3190	3120
3191	3120	1·1875	2·8593	·9375	1 3/16			3191	3120
3191V	3120	1·1875	2·8593	·9375	1 3/16	42	5	3191V	3120
3196	3120	1·3125	2·8593	·9375	1 3/16	33	14	3196	3120

Timken Roller Bearings.

English Sizes. Long Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price.		Bearing Cone.	No. Cup.
		Ins.	Ins.	Ins.	Ins.	Rs.	As.		
3196V	3120	1·3125	2·8593	·9375	1 9/16	42	5	3196V	3120
3350	3320	1·3750	3·1562	·9373	1 19/32			3350	3320
3352	3320	1·2500	3·1562	·9375	1 15/32			3352	3320
3358	3320	1·6250T	3·1562	·9375	1 11/32	40	11	3358	3320
3360	3320	1·3750	3·1562	·9375	1 11/32			3360	3320
3363	3320	1·5625	3·1562	·9375	1 11/32			3363	3320
3364	3320	1·6250	3·1562	·9375	1 19/32			3064	3320
3381	3320	1·5000	3·1562	·9375	1 9/32	37	6	3381	3320
3381T	3320	1·5000T	3·1562	·9375	1 9/32			3281T	3320
3381TV	3320	1·5000T	3·1562	·9375	1 9/32	40	1	3381TV	3320
3382TV	3320	4·5625T	3·1562	·9375	1 9/32			3382TV	3320
3383	3320	1·6250	3·1562	·9375	1 9/32	37	6	3383	3320
3455	3420	1·3750	3·1250	·9375	1½	40	11	3455	3420
3459	3420	1·5000	3·1250	·9375	1½			3459	3420
3554	3520	1·7500	3·3125	·9375	1 7/16			3554	3520
3555	3520	1·3750	3·3125	.9375	1 7/16	44	4	3555	3520
3556	3520	1·5000	3·3125	·9375	1 7/16			3556	3520
3656V	3620	·8125	2·4375	·9375	1 7/16	33	3	3656V	3620
3660K	3620	·8125	2·4375	·9375	1 1/8	38	1	3660K	3620
3750	3720	1·9687T	3·6718	·9375	1 7/16	44	4	3750	3720
3760	3720	1·7500	3·6718	·9375	1 7/16	44	14	3760	3720
3762	3720	2·0000	3·6718	·9375	1 7/16	46	14	3762	3720
3955	3920	2·5000	4·4375	·9375	1 7/16	59	4	3955	3920
4351	4320	1·7500	3 4843	1·3125	1 13/16			4351	4320
4359	4320	1·3750	3·4843	1·3125	1 13/16	56	10	4359	4320
4360	4320	1·7500	3·4843	1·3125	2			4360	4320
4361	4320	1·5000	3·4843	1·3125	2	56	5	4361	4320
4363	4320	1·6250	3·4843	1·3125	2	56	10	4363	4320
4364	4320	1·7500	3·4843	1·3125	1 13/16	55	0	4364	4320
4365	4320	1·5000	3·4843	1·3125	1 13/16	55	15	4365	4320
4367	4320	1·5625	3·4843	1·3125	1 9/16	56	10	4367	4520
4550	4520	2·1250T	3·9843	1·3125	1 13/16	63	2	4550	4520
4553	4520	2·1250	3·9843	1·3125	1 13/16	68	15	4553	3520
4554	4520	2·0000	3·9843	1·3125	1 13/16	62	12	4554	4520
4555	4520	1·5000	3·9843	1·3125	1 13/16	64	12	4555	4520
4558	4520	1·9687T	3·9843	1·3125	1 13/16	68	15	4558	4520
4559	4520	1·7716	3·9843	1·3125	1 9/16			4559	4520
5351	5320	2·0000	3·9843	1·4375	2 5/16	60	14	5351	5320
5354	5320	1 7500	3·9843	1 4375	2 1/16	65	12	5354	5320
5355	5320	2·0000	3·9843	1·4375	2 1/16	64	6	5355	5320
5356	5320	1·7500	3·9843	1·4375	1 15/16			5356	5320
5357	5320	1·7500	3·9843	1·4375	2 9/16	75	13	5357	5320
5358	5320	1·8750	3·9843	1·4375	1 15/16			5358	5320
5550	5520	2·6250T	4·7343	1·4375	2 1/16	88	13	5550	5520
5550	5521	2·6250T	5·1181	1·4375	2 1/16	92	1	5550	5521
5551	5520	2·2500	4·7343	1·4375	2 1/16	89	13	5551	5520
5552	5520	2·5000	4·7343	1·4375	2 1/16	97	10	5552	5520
5553	5520	2·6250	4·7343	1·4375	2 1/16	87	8	5553	5520
5554	5520	2·5625	4·7343	1·4375	2 1/16	97	10	5554	5520
5557	5520	2·6875	4·7343	1·4375	2 1/16			5557	5520
5558	5520	2·3125	4·7343	1·4375	2 1/16	89	8	5558	5520
5558	5540	2·3125	4·8750	1·4375	2 1/16	87	8	5558	5540
5563	5520	2·1250T	4·7343	1·4375	2 1/16	97	10	5563	5520
5752	5720	2·8750	5·5960	1·3750	2	97	5	5752	5720
5755	5720	3·0000	5·5960	1·3750	2	104	2	5755	5720
5756	5720	3·0000T	5·5960	1·3750	2	97	5	5756	5720
6352	6321	2·5625	5·1875	1·7500	2 11/16	118	13	6352	6321
6354	6321	2·2500	5·1875	1·7500		121	12	6354	6321

Timken Roller Bearings.

English Sizes. Long Series.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price. Rs.	As.	Bearing Cone.	No. Cup.
		Ins.	Ins.	Ins.	Ins.	Rs.	As.		
6355	6321	2·6250T	5·1875	1·7500	2½	118	2	6355	6321
6356	6321	2·7500T	5·1875	1·7500	2½	119	12	6356	6321
6358	6321	2·5625	5 1875	1 7500	2¼			6358	6321
6359	6321	2·2500	5·1875	1·7500	2⅛	115	3	6359	6321
6375E	6320	2·2500	5·3447	1·7500	2⅛	122	11	6375E	6320
6377E	6320	2·5625	5 3447	1·7500	2¼			6377E	6320
6378E	6320	2·6400T	5 3447	1·7500	2⅛			6378E	6320
6450	6420	2·8750T	5·8750	1·7500	2½	140	14	6450	6420
6451	6420	3·0625T	5·8750	1·7500	2½	139	10	6451	6420
6452	6420	2·8750	5·8750	1·7500	2½	141	14	6452	6420
6453	6420	2·7500	5 8750	1·7500	2¼	139	10	6453	6420
6456 (formerly 6455	6420 6420)	3·0000	5·8750	1·7500	2½	141	8	6456 (formerly 6455	6420 6420)
6550	6521	3·3750T	6·3125	1·7500	$2\frac{15}{16}$	153	14	6550	6521
6552	6520	3·5000	6 6870	1·7500	$2\frac{15}{16}$	168	14	6552	6520
6552	6521	3·5000	6·3125	1·7500	$2\frac{15}{16}$	154	4	6552	6521
6553	6521	3 3750	6·3125	1·7500	[illegible]	160	12	6553	6521
6554	6521	3·0000	6·3125	1·7500	$2\frac{15}{16}$			6554	6521

English Sizes. Special Type Bearings.

Bearing Cone.	No. Cup.	Bore.	Outside.	Cup Width.	Length between abutment faces.	Price. Rs.	As.	Bearing Cone.	No. Cup.
09070	09194	·6950	1·9380	·6875	[illegible]	18	14	09070	09194
09074	09194	·7500	1 9380	·6875	[illegible]			09074	09194
09068	09193	·6875 16 Thds. R.H	1·9380	·6875	$\frac{13}{16}$	16	4	09068	09193
09069	09193	·6875 16 Thds. L.H	1·9380	·6875	$\frac{15}{16}$	16	4	09069	09193
.09075	09194	·7475 16 Thds. R.H.	1·9380	·6875	$\frac{13}{16}$	15	5	09075	09194
09076	09194	·7475 16 Thds. L.H	1·9380	·6875	$\frac{13}{16}$	15	5	09076	09194
14118	14283	1·1810	2 8380	·6875	$\frac{31}{32}$	25	6	14118	14283
14120	14273	1·190	2·717	6675	1·0425	22	2	14120	14273
14121	14274	1·190	2·717	·625	$1\frac{1}{32}$	25	6	14121	14274
14125	14274	1·250	2·717	·625	$1\frac{1}{32}$	26	1	14125	14274

Ford Car Bearings.

One No. 09075/09194 } Nearside Front Wheel.
One No. 14120/14273 }
One No. 09076/09194 } Offside Front Wheel.
One No. 14120/14273 }
Two Dust Excluders.
Price, for complete set .. Rs. 74 8

Fordson Tractor Bearings.

		Each Rs.	As
Front Hub	No. 14118/14283	25	6
	No. 357/352	41	8
Worm	No. 78216/78551	104	12

SPECIAL NOTE.

Although this list of sizes is made as comprehensive as possible, new ones are constantly being developed, and if the one you need is not included do not fail to get into touch with us. It is our desire to be of real help to you.

Steel and Iron, Bars, Plates and Sections.

As Agents for Messrs. Dorman Long and Company, Limited, Middlesbrough, we carry large stocks of Steel and Iron in our Yard at Howrah and are in a position at all times to quote against any Specifications for building material, or factory requirements. Our stock of Structural Steel covers a wide range, and includes many sections not available elsewhere.

Stocks are also carried at our Bombay, Madras and Rangoon Branches.

We publish **monthly** a "Metal List" giving stock sections and current market rates.

Our Howrah Yard, and our Strand Road Warehouses, are in close proximity to Howrah Station, and to the termini of the various River Steamer Companies. This facilitates prompt despatch. We have our own Railway Sidings, and the delay sometimes experienced in booking large consignments from Calcutta Goods Stations is avoided.

All Steel and Iron stocked by us is manufactured to **British Standard Specification,** by Messrs. Dorman Long and Company, Limited, or other first class British makers, and the Tata Iron and Steel Company, Limited. We also import Continental and American Brands of steel if required by our customers.

Rolled Steel Beams are sold on calculated weight; all other Steel Sections on scaled weights.

Our rates in the case of Beams and Sections include cutting to lengths specified by constituents provided no wastage is involved.

All cutting (except when dead or exact lengths are specified) is done by cold chisel. An extra charge is made for cutting to dead lengths by High Speed Saw.

A coating of Red Oxide Paint can be given to Steel before despatch, if this is specified.

Dorman Long & Co.'s Rolled Steel Beams.

Note.—The British Engineering Standards Committee have revised the British Standard Section list of Beams, introducing a number of new sections and superseding others.

Reference Marks.

B.S.B.—British Standard Beams. This reference applies only to the existing old sections of Beams. We hold large stocks of these sections of which full details of dimensions and properties will be found on pages 256 and 257.

N.B.S.B.—New British Standard Beam. This reference applies only to Girder Sections. For details see pages 258 and 259.

N.B.S.H.B.—New British Standard Heavy Beam. This reference applies only to Heavy Beams and Stanchions. See pages 258 and 259.

We have been advised by Messrs. Dorman Long and Company, Limited, that rolls have been cut for the New Standard Sections, and that they are now in a position to execute orders for these. The New Sections have not yet been asked for to any extent in India, but when the demand becomes steady it is our intention to carry stocks of them.

We shall be glad to quote against any specification for New Section Beams, stating a period within which delivery would be made.

The **old sections** will eventually be entirely superseded, but the manufacturers are not likely to discontinue rolling them while there is a market.

Notes on I Beams.

The dimensions and properties of I Beams will be found on pages 256 to 259.

Tabular Loads.—The loads given in the tables on pages 257 and 259 include the weights of the girders themselves, and are based on an extreme fibre stress of 7.5 tons per square inch, being one-fourth of the average breaking stress. They are also calculated on the assumption that the beams receive the usual side support as in building work. For other cases such as concentrated, eccentric, or live loads, special calculations are necessary.

The resistance of the web to shear or buckle has been taken as the limiting factor in deciding the maximum load on each section. These loads should not be exceeded when sections are used at less spans than those for which such values are given.

Deflection.—Care should be taken in selecting beams that the deflection is not too great for the purpose for which they are employed. The zig zag lines in the tables indicate the generally accepted limit of span to depth (20 to 1) for girders supporting plastered ceilings at full tabular loads.

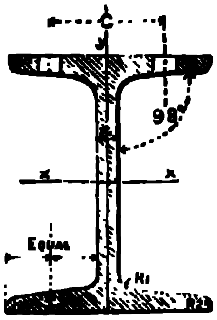
Deflection Co-efficient.—For I Beams of uniform section throughout their lengths, the deflection, in inches, for tabular loads is found by multiplying the square of the span, in feet, by the co-efficient which is given for each section. If the actual load is less than the tabular load, the deflection will be less in exactly the same proportion.

For ordinary Indian flat tiled roofs not carrying plastered ceilings, the maximum spans indicated by the zig-zag lines need not be adhered to, but camber should be given before erection to allow for the deflection.

Selection of I Beams.—It will be observed that, in the tables of distributed loads on beams, the relative order of the British Standard Sections has been maintained, and not arranged in the order of their carrying capacity.

It should be borne in mind that, where the depth is not restricted, a deeper and frequently a lighter section, carrying even a greater load than that required, may often be found more economical.

The tables, in any case, afford a ready means of selection.



Dorman Long & Co.'s Rolled Steel Beams.

British Standard Beams. Reference Mark B.S.B.

Dimensions and Properties.

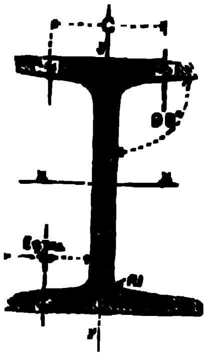
Reference Mark and Number	Size in Inches	Weight per Foot in Lbs.	Diagram. Web t	Diagram. Flange T	Diagram. Radius R₁	Diagram. Radius R₂	Area in Square Inches	Moments of Inertia About x—x	Moments of Inertia About y—y	Radii of Gyration in Inches About x—x	Radii of Gyration in Inches About y—y	Section Modulus about x—x	Centre of Holes C. Inches	per cwt Rs.	per cwt As.
B.S.B. 30	24×7½	100	·6	1·07	·7	·35	29·4	2654	66·92	9·5	1·5	221·1	4·5	13	0
B.S.B. 29	20×7½	80	·6	1·01	7	·35	26·17	1670	62·63	7·99	1·54	167·0	4·5	11	8
B.S.B. 28	18×7	75	·55	·928	·65	·325	22·06	1149	47·04	7·21	1·46	127·6	4·0	11	0
B.S.B. 27	16×6	62	·55	·847	·65	·325	18·23	725·7	27·08	6·31	1·21	90·71	3·5		
B.S.B. 26	15×6	59	·5	·88	·6	3	17·35	628·9	28·22	6·02	1·27	83·85	3·5		
B.S.B. 25	15×5	42	·42	·647	·52	·26	12·35	428	11·81	5·88	·978	57·06	2·75		
B.S.B. 24	14×6	57	5	·873	·6	3	16·76	532·9	27·96	5·63	1·29	76·12	3·5		
B.S.B. 23	14×6	46	·4	·69	·5	·25	13·53	440·5	21·6	5·7	1·26	62·92	3·5		
B.S.B. 22	12×6	54	·5	883	·6	·3	15·88	375·5	28·3	4·86	1·33	62·58	3·5		
B.S.B. 21	12×6	44	·4	·717	·5	·25	12·94	315·3	22·27	4·93	1·31	52·55	3·5		
B.S.B. 20	12×5	32	·35	55	·45	·225	9·41	220	9·753	4·83	1·01	36·66	2·75		
B.S.B. 19	10×8	70	·6	·97	·7	·35	20·6	344·9	71·67	4·09	1·86	68·98	4·75		
B.S.B. 18	10×6	42	·4	·736	·5	·25	12·35	211·5	22·25	4·13	1·36	42·3	3·5		
B.S.B. 17	10×5	30	·36	·552	·46	·23	8·82	145·6	9·79	4·06	1·05	29·12	2·75	10	4
B.S.B. 16	9×7	58	·55	·924	·65	·325	17·06	229·5	46·03	3·66	1·64	51·0	4·0		
*B.S.B. 15	9×4	21	·3	·46	·4	2	6·176	81·1	4·2	3·62	·824	18·02	2·25		
*B.S.B. 14	8×6	35	·44	·597	·54	·27	10·29	110·5	17·95	3·27	1·32	27·62	3·5		
B.S.B. 13	8×5	28	·35	·575	·45	·225	8·24	89·32	10·26	3·29	1·11	22·33	2·75		
*B.S.B. 12	8×4	18	·28	·402	·38	19	5·294	55·69	3·578	3·24	·822	13·92	2·25		
B.S.B. 11	7×4	16	·25	·387	·35	·175	4·706	39·21	3·414	2·88	·851	11·2	2·25		
*B.S.B. 10	6×5	25	·41	·52	·51	·255	7·35	43·61	9·116	2·43	1·11	14·53	2·75		
B.S.B. 9	6×4½	20	·37	·431	·47	·235	5·88	34·62	5·415	2·42	·959	11·54	2·5		
*B.S.B. 8	6×3	12	·26	·348	·36	·18	3·53	20·21	1·339	2·39	·616	6·736	1·5		
B.S.B. 7	5×4½	18	·29	·448	·39	·195	5·29	22·69	5·664	2·07	1·03	9·076	2·5		
B.S.B. 6	5×3	11	·22	·376	·32	·16	3·235	13·61	1·462	2·05	·672	5·444	1·5		
B.S.B. 5	4¾×1¾	6·5	·18	·325	·28	·14	1·912	6·73	·263	1·87	·37	2·833	..		
B.S.B. 4	4×3	9·5	·22	·336	·32	·16	2·794	7·52	1·281	1·64	·677	3·76	1·5	10	8
*B.S.B. 3	4×1¾	5	·17	·24	·27	·135	1·47	3·668	·186	1·58	·355	1·834	..		
B.S.B. 2	3×3	8·5	·2	·332	·3	·15	2·5	3·787	1·262	1·23	·71	2·524	1·5		
B.S.B. 1	3×1½	4	·16	·248	·26	·13	1·176	1·659	·124	1·18	·324	1·106	..	11	8

* These sections correspond exactly with New British Standard Sections. Stocks of all the above sections are usually carried in lengths from 12′ 0″ to 40′ 0″ rising by 1 foot.

British Standard Rolled Steel Beams.

Safe Loads in Tons Uniformly Distributed.

Depth in Inches	Breadth of Flange Inches.	Approx. Weight per Running Foot.	SPANS IN FEET.																		Deflection Co-efficient.
			2	4	6		10	12	14	16	18	20	22	24	26	28	30	32	36	40	
24	7½	100	..	..	..	..	102	92	79	69	61	55	50	46	42	39	36	34	30	27	·00078
20	7½	89	..	..	.	94	83	69	59	52	46	41	38	34	32	29	27	26	23	20	·000937
18	7	75	..	..	..	78	64	53	45	40	35	32	29	26	24	22	21	20	17	..	·00104
16	6	62	.	.	73	56	45	38	32	28	25	22	20	19	17	16	15	14	12	..	·00117
15	6	59	..	..	62	52	42	35	30	26	23	21	19	17	16	15	14	13	11	..	·00125
15	5	42	..	..	47	35	28	24	20	18	16	14	13	12	11	10	9·5	9	.	..	·00125
14	6	57	..	..	59	47	38	31	27	24	21	19	17	16	14	13	12	..	..	..	·00133
14	6	46	..	..	43	39	31	26	22	19	17	15	14	13	12	11	10	.	..	.	·00133
12	6	54	..	53	52	39	31	26	22	19	17	15	14	13	12	11	10	.	..	..	·00156
12	6	44	..	.	40	33	26	22	19	16	14	13	12	11	10	9		.		.	·00156
12	5	32	..	32	30	23	18	15	13	11	10	9	8·3	7·6	7	6·5	..	..	.	..	·00156
10	8	70	..	..	53	43	34	28	24	21	19	17	15	14	13	.		.	.	..	·001875
10	6	42	..	..	35	26	21	17	15	13	11	10	9·6	8·8	8	.		.		.	·001875
10	5	30	..	30	24	18	14	12	10	9	8	7·2	6·6	6	5·6	.	.	.	..	.	001875
9	7	58	..	44	42	32	25	21	18	16	14	12	11	10	9·8	.		.	.	..	·00208
9	4	21	..	22	15	11	9	7·5	6·4	5·6	5	4·5	4·0	3·7	..		.	..	..	..	·00208
8	6	35	..	31	23	17	14	11	9·8	8·6	7·7	7	6·3	..	..	..	..		.	..	·00234
8	5	28	..	25	18	14	11	9	8	7	6·2	5·5	5	..	..	.	..	.	.		·00234
8	4	18	19	17	11	8·7	7	5·8	5	4·3	3·8	3·5	3·2	..	..	..	.	..	..	..	·00234
7	4	16	15	14	9·4	7	5·6	4·7	4	3·5	3·1	2·8	2·5	..	..	..	..	..	..	..	·00268
6	5	25	22	18	12	9	7·3	6	5·2	4·5	4	..	..	..	..	..	.	..	..	..	·003125
6	4½	20	20	14	9·6	7·2	5·8	4·8	4·1	3·6	3·2	..	..	..	..	.	..	..	..	..	·003125
6	3	12	14	8·4	5·6	4·2	3·4	2·8	2·4	2·1	1·9	..	..	..	..	..	..	..	..	..	·003125
5	4½	18	13	11·3	7·6	5·6	4·5	3·8	3·2	2·8	..	..	..	..	..	..	..	..	..	..	·00375
5	3	11	9·8	6·8	4·5	3·4	2·7	2·3	1·9	1·7	..	..	..	..	..	..	..	..	..	..	·00375
4¾	1¾	6·5	7	3·5	2·4	1·8	1·4	1·2	1	..	..	..	..	..	..	..	..	..	..	..	·00395
4	3	9·5	7·8	4·7	3·1	2·3	1·9	1·6	1·3	..	..	..	..	..	..	..	..	..	..	..	·00469
4	1¾	5	4·6	2·3	1·5	1·1	·91	·76	·65	..	..	..	..	..	..	..	..	..	..	..	·00469
3	3	8·5	5·3	3·2	2	1·6	1·2	1	·9	..	..	..	..	..	..	..	..	..	..	..	·00625
3	1½	4	2·8	1·4	·92	·6	·55	·46	·39	..	..	..	..	..	..	..	..	..	..	..	·00625



Dorman Long & Co.'s Rolled Steel Beams.

New British Standard Beams. Reference Mark N.B.S.B.
New British Standard Heavy Beams.
Reference Mark N.B.S.H.B.

Dimensions and Properties.

Reference Mark and Number.	Size in Inches.	Weight per Foot in Lbs.	Diagrams.				Area in Square Inches.	Moments of Inertia.		Radii of Gyration in Inches.		Section Modulus about X—X	Centre of Holes C. Inches.	Price per Cwt	
			Web t	Flange T	Radius R1	Radius R2		About x—x	About y—y	About x—x	About y—y			Rs	A
Girder Sections.															
N.B.S.B. 18	24×7½	90	·52	·984	·73	·36	26·47	2443	60·44	9·61	1·51	203·6	4·5	13	0
N.B.S.B. 17	22×7	75	·50	·834	·69	·34	22·06	1677	41·07	8·72	1·36	152·4	4·0		
*N.B.S.B. 16	20×6½	65	·45	·820	·65	·32	19·12	1226	32·56	8·01	1·31	122·6	3·75	11	8
N.B.S.B. 15	18×6	55	·42	·757	·61	·30	16·18	841·8	23·64	7·21	1·21	93·53	3·5	11	0
N·B.S.B. 14	16×6	50	·40	·726	·61	·30	14·71	618·1	22·47	6·48	1·24	77·26	3·5	10	4
N.B.S.B. 13	15×6	45	·38	·655	·61	·30	13·24	491·9	19·87	6·10	1·23	65·59	3·5		
N.B.S.B. 12	14×5½	40	·37	·627	·57	·28	11·77	377·1	14·79	5·66	1·12	53·87	3·25		
N.B.S.B. 11	13×5	35	·35	·604	·53	·26	10·30	283·5	10·82	5·25	1·03	43·62	2·75		
N.B.S.B. 10	12×5	30	·33	·507	·53	·26	8·827	206·9	8.770	4·84	·997	34·49	2·75		
*N.B.S.B. 9	10×4½	25	·30	·505	·49	·24	7·354	122·3	6·486	4·08	·939	24·47	2·5		
†N.B.S.B. 8	9×4	21	·30	·457	·45	·22	6·177	81·13	4·148	3·62	·820	18·03	2·25		
†N.B.S.B. 7	8×4	18	·28	·398	·45	·22	5·296	55·63	3·506	3·24	·814	13·91	2.25		
N.B.S.B. 6	7×3½	15	·25	·398	·41	·20	4·416	35·90	2·408	2·85	·738	10·26	2·0		
†N.B.S.B. 5	6×3	12	·23	·377	·37	·18	3·533	20·99	1·461	2·44	·643	6·996	1·5		
N.B.S.B. 4	5×2½	9	·20	·347	·33	.16	2·647	10·91	·789	2·03	·546	4·364	..	10	8
N.B.S.B. 3	4½×2	7	·19	·322	·29	·14	2·060	6·652	·383	1·80	·431	2·957	..		
†N.B.S.B. 2	4×1¾	5	·17	·239	·27	·13	1·470	3·664	·186	1·58	·356	1·832	..		
N.B.S.B. 1	3×1½	4	·16	·249	·25	·12	1·177	1·660	·125	1·19	·326	1·107	..	11	8
Heavy Beams.															
N.B.S.H.B.11	18×8	80	·50	·950	·77	·38	23·53	1292	69·43	7·41	1·72	143·6	4·75	11	8
N.B.S.H.B.10	16×8	75	·48	·938	·77	·38	22·06	973·9	68·30	6·64	1·76	121·7	4·75	11	0
N.B.S.H.B. 9	14×8	70	·46	·920	·77	·38	20 59	705·6	66·67	5·85	1·80	100·8	4·75	10	4
N.B.S.H.B. 8	12×8	65	·43	·904	·77	·38	19·12	487·8	65·18	5·05	1·85	81·30	4·75		
N.B.S.H.B. 7	10×8	55	·40	·783	·77	·38	16·18	288·7	54·74	4·22	1·84	57·74	4·75		
N.B.S.H.B. 6	10×6	40	·36	·709	·61	·30	11·77	204·8	21·76	4·17	1·36	40·96	3·5		
N.B.S.H.B. 5	9×7	50	·40	·825	·69	·34	14·71	208·1	40·17	3·76	1·65	46·25	4·0		
†N.B·S.H.B. 4	8×6	35	·35	·648	·61	·30	10·30	115·1	19·54	3·34	1·38	28·76	3·5		
†N.B.S.H.B. 3	6×5	25	·33	·561	·53	·26	7·351	45·16	9·876	2·48	1·16	15·05	2·75		
N.B.S.H.B. 2	5×4½	20	·29	·513	·49	·24	5·882	25·03	6·590	2·06	1·06	10·01	2·5		
N.B.S.H.B. 1	4×3	10	·24	·347	·37	·18	2·940	7·786	1·326	1·63	·672	3·893	1·5	10	8

* These two new sections are now in stock.

† These sections correspond exactly with *Old* British Standard Beams, which are at present stocked, See two preceding pages.

New British Standard Rolled Steel Beams.

Girder Sections—N.B.S.B. **Heavy Beams—N.B.S.H.B.**

Safe Loads in Tons Uniformly Distributed.

Girder Sections.

Depth in Inches.	Breadth of Flange. Inches.	Approx. Weight per Running Foot	SPANS IN FEET.																		Deflection Co-efficient.
			2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	
24	7½	90	..	..	..	..	..	80	73	64	57	51	46	42	39	36	34	32	28	25	·00078
22	7	75	..	..	..	..	73	64	54	48	42	38	35	32	29	27	25	24	21	19	·00085
20	6½	65	..	..	..	..	59	51	44	38	34	31	28	26	24	22	20	19	17	15	·00094
18	6	55	..	..	..	51	47	39	33	29	26	23	21	19	18	17	16	15	13	12	·00104
16	6	50	..	..	..	46	39	32	28	24	21	19	18	16	15	14	13	12	11	..	·00117
15	6	45	..	..	..	41	33	27	23	20	18	16	15	14	13	12	11	10	9·1	..	·00125
14	5½	40	..	..	38	34	27	22	19	17	15	13	12	11	10	9·6	9	8·4	..	..	·00134
13	5	35	..	..	34	27	22	18	16	14	12	11	9·9	9·1	8·4	7·8	7·3	..	..	..	·00144
12	5	30	..	30	29	22	17	14	12	11	9·6	8·6	7·8	7·2	6·6	6·2	..	..	..	..	·00156
10	4½	25	..	24	20	15	12	10	8·7	7·6	6·8	6·1	5·6	5·1	..	..	..	..	..	..	·00188
9	4	21	..	22	15	11	9	7·5	6·4	5·6	5	4·5	4·1	3·8	..	..	..	..	..	..	·00208
8	4	18	19	17	12	8·7	7	5·8	5	4·3	3·9	3·5	3·2	..	..	..	..	..	..	..	·00234
7	3½	15	15	13	8·5	6·4	5·1	4·3	3·7	3·2	2·8	2·6	..	..	..	..	..	..	..	..	·00268
6	3	12	12	8·7	5·8	4·4	3·5	2·9	2·5	2·2	1·9	..	..	..	..	..	..	..	..	..	·00313
5	2½	9	8·8	5·5	3·6	2·7	2·2	1·8	1·6	1·4	..	..	..	..	..	..	..	..	..	..	·00375
4½	2	7	7·4	3·7	2·5	1·8	1·5	1·2	1·1	..	..	..	..	..	..	..	..	..	..	..	·00417
4	1¾	5	4·6	2·3	1·5	1·1	·92	·76	·65	..	..	..	..	..	..	..	..	..	..	..	·00469
3	1½	4	2·8	1·4	·92	·7	·55	·46	·4	..	..	..	..	..	..	..	..	..	..	..	·00625

Heavy Beams.

18	8	80	..	..	..	..	69	60	51	45	40	36	33	30	28	26	24	22	20	18	·00104
16	8	75	..	..	..	..	61	51	43	38	34	30	28	25	23	22	20	19	17	..	·00117
14	8	70	..	..	..	53	50	42	36	31	28	25	23	21	19	18	17	16	..	..	·00134
12	8	65	..	..	..	44	41	34	29	25	23	20	18	17	16	15	..	..	..	..	·00156
10	8	55	..	..	..	36	29	24	21	18	16	14	13	12	..	..	..	..	..	..	·00188
10	6	40	..	..	31	26	20	17	15	13	11	10	9·3	8·5	..	..	..	..	..	..	·00188
9	7	50	..	..	32	29	23	19	17	14	13	12	11	9·6	..	..	..	..	..	..	·00208
8	6	35	..	25	24	18	14	12	10	9	8	7·2	6·5	..	..	..	..	..	..	..	·00234
6	5	25	..	18	13	9·4	7·5	6·3	5·4	4·7	4·2	..	..	..	..	..	..	..	..	..	·00313
5	4½	20	..	13	8·3	6·3	5	4·2	3·6	3·1	..	..	..	..	..	..	..	..	..	..	·00375
4	3	10	8·6	4·9	3·2	2·4	1·9	1·6	1·4	..	..	..	..	..	..	..	..	..	..	..	·00469

Mild Steel Channels.

We carry large stocks of Mild Steel Channels, manufactured by Messrs. Dorman Long and Co., Ltd., and Messrs. Tata Iron and Steel Co., Ltd. These are manufactured to conform to British Standard Specification No. 15 for Structural Steel for Bridge Work, as laid down by the Engineering Standards Committee, and are branded with the makers' name.

As in the case of Rolled Steel Beams the Standards Committee have revised the sections. Our stocks now include many of the new sections as will be noted by comparison of our table of stock sections, with the table of new British Standard Channels given below.

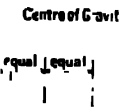
British Standard Channels.

Stock Sections.

Size. In.	Approx. Weight per Foot in Lbs.	Price per Cwt. Rs. A.	Size In.	Approx. Weight per Foot in Lbs.	Price per Cwt. Rs A.	Size. In.	Approx. Weight per Foot in Lbs.	Price per Cwt Rs A
				17·9				
	5·27	13 0		17·56		9 4	28·55	
	7·96			20·20		10 3½	23·55	
3	14·20			19·30	12 0	10 4	30·16	12 0
2½	10·98	12 0		22·72		12 3½	26·10	
	12·04			19·37		12 4	36·47	
	14·49			22·27		15 4	41·94	13 0

Mild Steel Channels.

New British Standard.



Reference Mark N.B.S.C.

Dimensions and Properties in inch units.

Reference Mark.	Size A × B	Standard Thickness t	Standard Thickness T	Radii R	Radii r	Weight per Foot in Lbs	Area in Square Inches	P Dimension.	Moments of Inertia. About xx	Moments of Inertia. About yy	Section Moduli. About xx	Section Moduli. About yy	Radii of Gyration in Inches About xx	Radii of Gyration in Inches About yy
N.B.S.C. 18	17×4	·48	·68	·60	·30	44·34	13·041	·920	520·2	15·26	61·20	4·955	6·32	1·08
„ 17	15×4	·41	·62	·60	·30	36·37	10·696	·967	349·1	13·34	46·55	4·398	5·71	1·12
„ 16	12×4	·40	·60	·60	·30	31·33	9·214	1·055	200·1	12·12	33·35	4·116	4·66	1·15
„ 15	12×3½	·40	·60	·54	·27	29·23	8·596	·901	180·3	8·436	30·05	3·245	4·58	·901
„ 14	12×3½	·35	·50	·54	·27	25·25	7·426	·849	156·4	7·066	26·07	2·665	4·59	·975
„ 13	10×3½	·36	·56	·54	·27	24·46	7·193	·965	109·5	7·420	21·90	2·927	3·90	1·02
„ 12	10×3	·32	·45	·48	·24	19·28	5·672	·742	82·66	3·983	16·53	1·764	3·82	·838
„ 11	9×3½	·34	·54	·54	·27	22·27	6·549	1·003	82·62	6·899	18·36	2·763	3·55	1·03
„ 10	9×3	·30	·44	·48	·24	17·46	5·136	·781	62·52	3·752	13·89	1·691	3·49	·855
„ 9	8×3½	·32	·52	·54	·27	20·21	5·944	1·045	60·57	6·370	15·14	2·595	3·19	1·04
„ 8	8×3	·28	·44	·48	·24	15·96	4·694	·834	46·72	3·578	11·68	1·652	3·16	·873
„ 7	7×3½	·30	·50	·54	·27	18·28	5·376	1·092	42·83	5·834	12·24	2·423	2·82	1·04
„ 6	7×3	·26	·42	·48	·24	14·22	4·182	·875	32·75	3·255	9·357	1·531	2·80	·882
„ 5	6×3½	·28	·48	·54	·27	16·48	4·848	1·143	28·88	5·293	9·627	2·246	2·44	1·05
„ 4	6×3	·25	·38	·48	·24	12·41	3·650	·890	21·27	2·825	7·090	1·339	2·41	·880
„ 3	5×2½	·25	·38	·42	·21	10·22	3·006	·773	11·87	1·641	4·749	·950	1·99	·739
„ 2	4×2	·24	·31	·36	·18	7·09	2·085	·599	5·063	·703	2·532	·502	1·56	·581
„ 1	3×1½	·20	·28	·30	·15	4·60	1·352	·476	1·823	·261	1·215	·255	1·16	·439

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** **RANGOON, MADRAS, BOMBAY, LONDON.**

Mild Steel Angles and Tees.

We carry large stocks of Mild Steel Angles and Tees manufactured by Messrs. Dorman Long and Co., Ltd., and Messrs. Tata Iron and Steel Co., Ltd. These are manufactured to conform to British Standard Specification No. 15 for Structural Steel and Bridge Work, as laid down by the Engineering Standards Committee, and are branded with the makers' name.

If quality is not important we can quote cheaper rates for unbranded bars.

The rates given below are for stock lengths, *viz.*:—

Angles. Light Sections, up to and including 2 ins. by 2 ins. by ¼ in.—30 ft. to 32 ft.
Heavy „ from 2¼ ins. by 2¼ ins. by ¼ in. to 6 ins. by 6 ins. by ⅝ in.—36 ft. to 40 ft.

Tees. Light Sections, up to and including 2 ins. by 2 ins. by ¼ in.—30 ft. to 32 ft.
Heavy „ from 2¼ ins. by 2¼ ins. by ¼ in. to 6 ins. by 3 ins. by ½ in.—36 ft. to 40 ft.

An extra charge is made for cutting to specified lengths.

Special rates can be arranged for large quantities.

Bulb Angles and Tees quoted for on application.

British Standard Angles.

Stock Sections.

Size. In.	Approx. Weight per Foot in Lbs.	Price per Cwt. Rs. A.
1 × 1 × ⅛	0·75	11 12
1 × 1 × ¼	1·49	
1¼ × 1¼ × ¼	1·91	
1¼ × 1¼ × 3/16	1·47	
1½ × 1½ × 3/16	1·79	11 0
1½ × 1½ × ¼	2·33	
1¾ × 1¾ × ¼	2·77	
1¾ × 1¾ × 3/16	2·11	
2 × 2 × 3/16	2·43	10 12
2 × 2 × ¼	3·19	
2 × 2 × ⅜	4·62	
2¼ × 2¼ × ¼	3·61	
2½ × 2½ × ¼	4·04	10 12
2½ × 2½ × 5/16	4·98	
2½ × 2½ × ⅜	5·89	
2½ × 2½ × ½	7·65	
3 × 3 × ¼	4·90	
3 × 3 × 5/16	6·05	
3 × 3 × ⅜	7·18	
3 × 3 × ½	9·36	
3½ × 3½ × ⅜	8·45	
3½ × 3½ × ½	11·05	
4 × 4 × ⅜	9·72	
4 × 4 × ½	12·75	
5 × 5 × ⅜	12·27	10 12
5 × 5 × ½	16·15	
5 × 5 × ¾	22·59	
6 × 6 × ½	19·56	
6 × 6 × ⅝	24·18	
Unequal Angles.		
3 × 2 × ¼	4·04	11 0
3 × 2 × ⅜	5·89	
3½ × 2½ × ⅜	7·18	
4 × 3 × ⅜	8·45	
4 × 3 × ½	11·05	
5 × 3 × ⅜	9·72	
6 × 3 × ⅜	11·00	
6 × 4 × ½	16·15	

British Standard Tees.

Stock Sections.

Size. In.	Approx. Weight per Foot in Lbs.	Price per Cwt. Rs. A.
1¾ × 1¾ × 3/16	2·11	12 0
1¼ × 1¼ × ¼	1·88	
1½ × 1½ × ¼	2·35	
2 × 2 × ¼	3·22	11 0
2 × 2 × ⅜	4·64	
2¼ × 2¼ × ¼	3·64	
2½ × 2½ × ¼	4·07	
2½ × 2½ × 5/16	5·01	11 0
2½ × 2½ × ⅜	5·92	
3 × 3 × ¼	4·91	
3 × 3 × 5/16	6·08	
3 × 3 × ⅜	7·21	
3 × 3 × ½	9·38	
3½ × 3½ × ⅜	8·49	11 0
3½ × 3½ × ½	11·08	
4 × 4 × ⅜	9·77	
4 × 4 × ½	12·78	
4 × 3 × 5/16	6·97	
4 × 3 × ⅜	8·49	
4 × 3 × ½	11·08	
6 × 3 × ⅜	11·00	

Mild Steel Half Rounds, 1½"×½", 2"×½", 2"×⅝". **Rs. 11-8** per cwt.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

British Standard Mild Steel Flat Bars.

Size in Inches.	Weight per Foot in Lbs.	Price per Cwt. Rs.	A.
2 × 3/16	1.28	11	0
4 × 3/16	2.55		
6 × 3/16	3.33		
7 × 3/16	4.46		
8 × 3/16	5.10		
9 × 3/16	5·74		
10 × 3/16	6.38		
12 × 3/16	7.65		
14 × 3/16	8.95		
15 × 3/16	9.56		
18 × 3/16	11.48		
¾ × ¼	0.37	10	8
1 × ¼	0.85		
1¼ × ¼	1.06		
1½ × ¼	1.28		
1¾ × ¼	1.49		
2 × ¼	1.70		
2¼ × ¼	1.91		
2½ × ¼	2.13		
3 × ¼	2.55		
3½ × ¼	2.98		
4 × ¼	3.40		
5 × ¼	4.25		
6 × ¼	5.10	11	0
8 × ¼	6.80		
9 × ¼	7.65		
10 × ¼	8.50		
12 × ¼	10.20		
13 × ¼	11.05		
14 × ¼	11.90		
15 × ¼	12.75		
16 × ¼	13.60		
18 × ¼	15.30	11	0
2 × 5/16	2.13	10	8
2¼ × 5/16	2.39		
2½ × 5/16	2.66		
3 × 5/16	3.19		
4 × 5/16	4.25		
6 × 5/16	6.38		
9 × 5/16	9.56	11	0
12 × 5/16	12.75		
15 × 5/16	15.94		
18 × 5/16	19.13		
1 × ⅜	1.28	10	8
1¼ × ⅜	1.59		
1½ × ⅜	1.91		
1¾ × ⅜	2.23		
2 × ⅜	2.55		
2¼ × ⅜	2.87		
2½ × ⅜	3.19		
3 × ⅜	3.81		
3½ × ⅜	4.46		
4 × ⅜	5.10		
5 × ⅜	6.69		
6 × ⅜	7.65		
7 × ⅜	8.93		
8 × ⅜	10.20	11	0
9 × ⅜	11.48		
10 × ⅜	12.75		
12 × ⅜	15.30		
13 × ⅜	16.58		
14 × ⅜	17.85		
15 × ⅜	19.13		
16 × ⅜	20.40		
18 × ⅜	22.95	11	0
1 × ½	1.70	10	8
1½ × ½	2.55		
1¾ × ½	2.98		
2 × ½	3.40		
2¼ × ½	3.83		
2½ × ½	4.25		
3 × ½	5.10		
3½ × ½	5.95		
4 × ½	6.80		
5 × ½	8.50		
5½ × ½	9.35		
6 × ½	10.20		
7 × ½	11.90	11	0
8 × ½	13.60		
9 × ½	15.30		
10 × ½	17.00		
12 × ½	20.40		
14 × ½	23.80		
15 × ½	25.50		
16 × ½	27.20		
18 × ½	30.60		
19 × ½	32.30		
1½ × ⅝	3.19	10	8
2 × ⅝	4.25		
2½ × ⅝	5.31		
3 × ⅝	6.38		
3½ × ⅝	7.44		
4 × ⅝	8.50		
5 × ⅝	10.63		
6 × ⅝	12.75	11	0
7 × ⅝	14.88		
8 × ⅝	17·00	11	0
12 × ⅝	25.50		
19 × ⅝	40.38		
1½ × ¾	3.83		
2 × ¾	5.10		
2½ × ¾	6.38		
3 × ¾	7.65		
4 × ¾	10.20		
5 × ¾	12.75		
6 × ¾	15.30		
8 × ¾	20.40		
9 × ¾	22.95		
12 × ¾	30.60		
14 × ¾	35.70		
2 × ⅞	5.65		
3 × ⅞	8.93		
6 × ⅞	17.85		
12 × ⅞	35.70		
2 × 1	6.80		
2½ × 1	8.50		
3 × 1	10.20		
4 × 1	13.60		
5 × 1	17.00		
6 × 1	20.40		
3 × 1¼	12.75	12	0
4 × 1¼	17.0		
6 × 1¼	25.50		
3 × 1½	15.30		
4 × 1½	20.20		
3½ × 1¾	20.82		
3 × 2	20.40		
5 × 2½	42.50		
5 × 3	51·00		

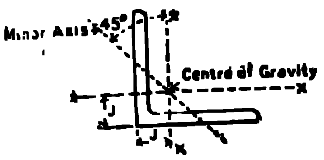
British Standard Mild Steel Rounds.

Size in Inches.	Weight per Foot in Lbs.	Price per Cwt. Rs.	A.
¼	.167	13	8
5/16	.361		
⅜	.376	12	0
7/16	.511		
½	.668	10	8
⅝	1.043		
¾	1.502		
⅞	2.044		
1	2.670		
1⅛	3.380		
1¼	4.182		
1⅜	5.049		
1½	6.008		
1⅝	7.051		
1¾	8.178		
1⅞	9.388	10	8
2	10.681		
2⅛	12.06		
2¼	13.52		
2⅜	15.06		
2½	16.69		
2⅝	18.40		
2¾	20.19		
2⅞	22.07		
3	24.03		
3⅛	26.08		
3¼	28.21		
3⅜	30.42		
3½	32.71		
3⅝	35.09		
3¾	37.55	11	0
3⅞	40.10		
4	42.73	11	8
4⅛	45.44		
4¼	48.23		
4⅜	51.11		
4½	54.07		
4⅝	57.12		
4¾	60.25		
4⅞	63.46		
5	66.76		
5⅛	70.14		
5¼	73.60		
5⅜	77.15		
5½	80.78		
5⅝	84.49	11	8
5¾	88.29		
5⅞	92.17		
6	96.13		
6¼	104.31	12	0
6½	112.82		
6¾	121.67		
7¼	140.36	16	0
7½	150.6		
7¾	160.39		
8¼	181.75	17	0
8¾	204.45		
9¼	228.48		
9½	241.0		
9¾	254.4		
10¼	281.2		

British Standard Mild Steel Squares.

Size in Inches.	Weight per Foot in Lbs.	Price per Cwt Rs.	A.
3/16	0.120	13	0
¼	0.213		
⅜	0.478	12	0
½	0.849	10	8
⅝	1.328	10	8
¾	1·912		
⅞	2·603		
	3·400		
1¼	5.312	10	8
1½	7·650		
1¾	10·412		
2	13·600		
2¼	17·25		
2½	31·25	10	8
3	30·60		
3½	41·65		
4	54·4		

N.B.—The weights given are approximate only. No rolling margin has been added. This should be included in preparing estimates.



Mild Steel Equal Angles.

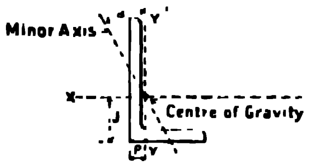
British Standard.

Reference Mark B.S.E.A.

Dimensions and Properties in inch units.

Reference Mark.		Size and Thickness.	Area in Square Inches.	Weight per Foot in Lbs.	Radii. Root.	Radii. Toe.	Dimension. J	Moment of Inertia. XX	Section Modulus. YY	Least Radius of Gyrt'n.
B·S·E·A·	16	8 × 8 × ½	7·75	26·35	·600	·425	2·15	47·4	8·10	1·58
,,	16	8 × 8 × ⅝	9·609	32·67	·600	·425	2·20	58·2	10·03	1·57
,,	16	8 × 8 × ¾	11·437	38·89	·600	·425	2·25	68·5	11·91	1·56
,,	16	8 × 8 × ⅞	13·234	45·00	·600	·425	2·30	78·41	13·76	1·56
,,	14	6 × 6 × ⅜	4·362	14·83	·475	·325	1·61	14·99	3·41	1·19
,,	14	6 × 6 × ½	5·753	19·56	·475	·325	1·66	19·52	4·50	1·18
,,	14	6 × 6 × ⅝	7·112	24·18	·475	·325	1·71	23·8	5·55	1·18
,,	14	6 × 6 × ¾	8·441	28·70	·475	·325	1·76	27·8	6·56	1·17
,,	14	6 × 6 × 1	11·003	37·41	·475	·325	1·85	35·09	8·46	1·16
,,	13	5 × 5 × 5/16	3·028	10·30	·425	·300	1·34	7·18	1·96	·99
,,	13	5 × 5 × ⅜	3·610	12·27	·425	·300	1·37	8·51	2·34	·98
,,	13	5 × 5 × ½	4·750	16·15	·425	·300	1·42	11·0	3·07	·98
,,	13	5 × 5 × ⅝	5·860	19·92	·425	·300	1·47	13·4	3·80	·98
,,	13	5 × 5 × ¾	6·938	23·59	·425	·300	1·51	15·5	4·44	·96
,,	12	4½ × 4½ × ⅜	3·236	11·00	·400	·275	1·22	6·14	1·87	·88
,,	12	4½ × 4½ × ½	4·252	14·46	·400	·275	1·29	7·92	2·47	·87
,,	12	4½ × 4½ × ⅝	5·236	17·80	·400	·275	1·34	9·56	3·03	·87
,,	12	4½ × 4½ × ¾	6·189	21·04	·400	·275	1·39	11·1	3·57	·87
,,	11	4 × 4 × 5/16	2·402	8·17	·350	·250	1·10	3·61	1·24	·78
,,	11	4 × 4 × ⅜	2·859	9·72	·350	·250	1·12	4·26	1·48	·78
,,	11	4 × 4 × ½	3·749	12·75	·350	·250	1·17	5·46	1·93	·77
,,	11	4 × 4 × ⅝	4·609	15·67	·350	·250	1·22	6·56	2·36	·77
,,	10	3½ × 3½ × 5/16	2·091	7·11	·325	·225	·975	2·39	·95	·68
,,	10	3½ × 3½ × ⅜	2·485	8·45	·325	·225	1·00	2·80	1·12	·68
,,	10	3½ × 3½ × ½	3·251	11·05	·325	·225	1·05	3·57	1·46	·68
,,	10	3½ × 3½ × ⅝	3·985	13·55	·325	·225	1·09	4·27	1·77	·68
,,	9	3 × 3 × ¼	1·44	4·90	·300	·200	·827	1·21	·56	·59
,,	9	3 × 3 × 5/16	1·779	6·05	·300	·200	·853	1·47	·68	·58
,,	9	3 × 3 × ⅜	2·111	7·18	·300	·200	·877	1·72	·81	·58
,,	9	3 × 3 × ½	2·752	9·36	·300	·200	·924	2·19	1·05	·58
,,	9	3 × 3 × ⅝	3·362	11·43	·300	·200	·970	2·59	1·28	·58
,,	7	2½ × 2½ × ¼	1·187	4·04	·275	·200	·703	·677	·38	·48
,,	7	2½ × 2½ × 5/16	1·464	4·98	·275	·200	·728	·822	·46	·48
,,	7	2½ × 2½ × ⅜	1·733	5·89	·275	·200	·752	·962	·55	·48
,,	7	2½ × 2½ × ½	2·249	7·65	·275	·200	·799	1·21	·71	·48
,,	6	2¼ × 2¼ × ¼	1·063	3·61	·250	·175	·643	·489	·30	·44
,,	6	2¼ × 2¼ × 5/16	1·309	4·45	·250	·175	·668	·592	·37	·43
,,	6	2¼ × 2¼ × ⅜	1·547	5·26	·250	·175	·692	·686	·44	·43
,,	5	2 × 2 × 3/16	·715	2·43	·250	·175	·554	·260	·18	·39
,,	5	2 × 2 × ¼	·938	3·19	·250	·175	·581	·336	·24	·39
,,	5	2 × 2 × 5/16	1·153	3·92	·250	·175	·605	·401	·29	·38
,,	5	2 × 2 × ⅜	1·36	4·62	·250	·175	·629	·467	·34	·38
,,	4	1¾ × 1¾ × 3/16	·622	2·11	·225	·150	·495	·172	·14	·34
,,	4	1¾ × 1¾ × ¼	·814	2·77	·225	·150	·520	·220	·18	·34
,,	4	1¾ × 1¾ × 5/16	·997	3·39	·225	·150	·544	·264	·22	·34
,,	3	1½ × 1½ × 3/16	·526	1·79	·200	·150	·434	·105	·10	·29
,,	3	1½ × 1½ × ¼	·686	2·33	·200	·150	·458	·134	·13	·29
,,	3	1½ × 1½ × 5/16	·839	2·85	·200	·150	·482	·159	·16	·29
,,	2	1¼ × 1¼ × 3/16	·433	1·47	·200	·150	·371	·058	·07	·24
,,	2	1¼ × 1¼ × ¼	·561	1·91	·200	·150	·396	·073	·09	·23

Mild Steel Unequal Angles.



British Standard and Dorman Long's Special Sections.

Reference Marks B.S.U.A. and D.L.U.A.

Dimensions and Properties in inch units.

Reference Mark.		Size and Thickness.	r a Squ Inch	Weight p Foot in Lb	Radii		Dimensions.		Moments of Inertia.		Section Moduli.		Angle α Degrees.	ast Radiu Gyration.
						Toe.	J		bou XX	ou YY	bou XX	Abou YY		
B.S.U.A.	25	7 ×3½×⅜	3·797	12·91	·425	·30	2·45	·713	19·30	3·32	4·24	1·19	15	·75
"	25	7 ×3½×½	5·000	17·00	·425	·30	2·50	·764	25·1	4·28	5·58	1·56	14½	·74
"	25	7 ×3½×⅝	·172	20·98	·425	·30	2·55	·814	30·55	5·15	6·86	1·92	14½	·74
"	25	7 ×3½×¾	313	24·86	·425	·30	2·60	·862	35·68	5·95	8·11	2·26	14	·73
"	24	6½×4½×⅜	3·982	13·54	·45	·325	2·03	1·04	17·08	6·76	3·82	1·95	25½	·98
"	24	6½×4½×½	5·248	17·84	·45	·325	2·08	1·09	22·2	8·75	5·02	2·57	25	·97
"	24	6½×4½×⅝	5·482	22·04	·45	·325	2·13	1·14	27·09	10·60	6·20	3·15	25	·96
"	24	6½×4½×¾	7·686	26·13	·45	·325	2·18	1·19	31·66	12·32	7·33	3·72	25	·96
"	22	6½×3½×⅜	3·610	12·27	·425	·30	2·22	·741	15·7	3·27	3·67	1·18	16½	·75
"	22	6½×3½×½	4·750	16·15	·425	·30	2·28	·792	20·4	4·20	4·83	1·55	16½	·75
"	22	6½×3½×⅝	860	19·92	·425	·30	2·33	·841	24·83	5·06	5·95	1·90	16	·74
"	21	6 ×4 ×⅜	3·610	12·27	·425	·30	1·91	923	13·2	4·73	3·23	1·54	23½	·87
"	21	6 ×4 ×½	4·750	16·15	·425	·30	1·96	·974	17·1	6·10	4·23	2·02	23½	·86
"	21	6 ×4 ×⅝	5·860	19·92	·425	·30	2·02	1·02	20·8	7·36	5·23	2·47	23½	·86
"	21	6 ×4 ×¾	·938	23·59	·425	·30	2·06	1·07	24·24	8·52	6·15	2·91	23	·85
"	20	6 ×3½×⅜	424	11·64	·40	·275	2·01	·773	12·6	3·22	3·16	1·18	19	·76
"	20	6 ×3½×½	4·502	15·31	·40	·275	2·06	·823	16·4	4·14	4·16	1·55	19	·75
"	20	6 ×3½×⅝	5·549	18·87	·40	·275	2·11	·872	19·88	4·97	5·11	1·89	18½	·75
"	20	6 ×3½×¾	5·501	22·32	·40	·275	2·16	·919	23·14	5·74	6·03	2·22	18	·74
D.L.U.A.	20A	6 ×3 ×⅜	3·236	11·00	·40	·275	2·12	·632	12·0	2·05	3·09	·87	14½	·64
"	20A	6 ×3	4·252	14·46	·40	·275	2·17	·683	15·5	2·62	4·05	1·13	14½	·63
"	20A	6 ×3 ×⅝	5·236	17·80	·40	·275	2·22	·731	18·79	3·13	4·97	1·38	14	·63
B.S.U.A.	19	5½×3½×⅜	3·236	11·00	·40	·275	1·80	·807	9·93	3·15	2·68	1·17	22	·76
"	19	5½×3½×½	4·252	14·46	·40	·275	1·85	·857	12·80	4·05	3·51	1·53	22	·75
"	19	5½×3½×⅝	5·236	17·80	·40	·275	1·90	·905	15·6	4·86	4·33	1·87	21½	·75
"	18	5½×3 ×5/16	2·562	8·71	·375	·25	1·87	·636	8·00	1·72	2·20	·73	17	·65
"	18	5½×3 ×⅜	3·050	10·37	·375	·25	1·90	·662	9·45	2·02	2·62	·86	17	·64
"	18	5½×3 ×½	4·003	13·61	·375	·25	1·95	·711	12·2	2·58	3·44	1·13	16½	·64
"	18	5½×3 ×⅝	4·925	16·74	·375	·25	2·00	·759	14·7	3·08	4·20	1·37	16½	·63
"	17	5 ×4 ×⅜	3·236	11·00	·40	·275	1·51	1·01	7·96	4·53	2·28	1·52	32	·85
"	17	5 ×4 ×½	4·252	14·46	·40	·275	1·56	1·06	10·3	5·82	2·99	1·98	32	·84
"	17	5 ×4 ×⅝	5·236	17·80	·40	·275	1·60	1·11	12·4	7·01	3·66	2·43	32	·83
"	16	5 ×3½×5/16	2·562	8·71	·375	·25	1·56	·822	6·47	2·63	1·88	·98	25½	·76
"	16	5 ×3½×⅜	3·050	10·37	·375	·25	1·59	·848	7·64	3·09	2·24	1·17	25½	·75
"	16	5 ×3½×½	4·003	13·61	·375	·25	1·64	897	9·86	3·96	2·93	1·52	25½	·75
"	16	5 ×3½×⅝	4·925	16·74	·375	·25	1·69	·944	11·9	4·75	3·60	1·86	25	·74
"	15	5 ×3 ×5/16	2·402	8·17	·35	·25	1·66	·667	6·14	1·68	1·84	·72	20	·65
"	15	5 ×3 ×⅜	2·859	9·7	·35	·25	1·68	·693	7·24	1·97	2·18	·85	19½	·65
"	15	5 ×3 ×½	3·749	12·75	·35	·25	1·73	·742	9·33	2·51	2·85	1·11	19½	·64

Mild Steel Unequal Angles.

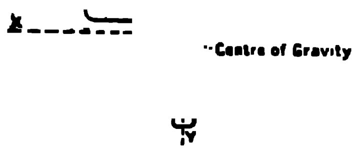
British Standard and Dorman Long's Special Sections.

Reference Marks B.S.U.A. and D.L.U.A.

Dimensions and Properties in inch units.

Reference Mark.		Size and Thickness.	Area in Square Inches.	Weight per Foot in Lbs.	Radii·		Dimensions.		Moments of Inertia·		Section Moduli·		Angle α Degrees·	Least Radius of Gyration·
					Root.	Toe.	j	p	About xx	About yy	About xx	About yy		
B.S.U.A.	15	5 ×3 ×⅝	4·609	15·67	·35	·25	1·78	·789	11·25	3·00	3·49	1·36	19	·64
„	14	4½×3½×5/16	2·402	8·17	·35	·25	1·36	·866	4·82	2·55	1·54	·97	30½	·74
„	14	4½×3½×⅜	2·859	9·72	·35	·25	1·39	·891	5·69	3·00	1·83	1·15	30½	·74
„	14	4½×3½×½	3·749	12·75	·35	·25	1·41	·940	7·31	3·84	2·39	1·5	30	·74
„	14	4½×3½×⅝	4·609	15·67	·35	·25	1·48	·987	8·81	4·61	2·92	1·83	30	·74
„	12	4 ×3½×5/16	2·246	7·64	·35	·25	1·16	·915	3·46	2·47	1·22	·96	37	·72
„	12	4 ×3½×⅜	2·671	9·08	·35	·25	1·19	·941	4·08	2·90	1·45	1·13	37	·72
„	12	4 ×3½×½	3·499	11·90	·35	·25	1·24	·990	5·23	3·71	1·89	1·48	37	·71
„	12	4 ×3½×⅝	4·296	14·61	·35	·25	1·28	1·04	6·28	4·44	2·31	1·80	36½	·71
„	11	4 ×3 ×5/16	2·091	7·11	·325	·225	1·24	·746	3·31	1·59	1·20	·71	28½	·64
„	11	4 ×3 ×⅜	2·485	8·45	·325	·225	1·27	·771	3·89	1·87	1·42	·84	28½	·64
„	11	4 ×3 ×½	3·251	11·05	·325	·225	1·31	·819	4·98	2·37	1·85	1·09	28½	·63
„	11	4 ×3 ×⅝	3·985	13·55	·325	·225	1·36	·865	5·96	2·83	2·26	1·33	28	·63
„	10	4 ×2½×¼	1·563	5·31	·325	·225	1·30	·561	2·54	·767	·94	·40	21	·54
„	10	4 ×2½×5/16	1·934	6·58	·325	·225	1·33	·587	3·11	·935	1·16	·49	21	·54
„	10	4 ×2½×⅜	2·298	7·81	·325	·225	1·35	·612	3·65	1·09	1·38	·58	21	·53
„	10	4 ×2½×½	3·001	10·20	·325	·225	1·40	·660	4·66	1·38	1·79	·75	20½	·53
„	9	3½×3 ×5/16	1·934	6·58	·325	·225	1·04	·792	2·27	1·53	·92	·69	35½	·62
„	9	3½×3 ×⅜	2·298	7·81	·325	·225	1·07	·819	2·67	1·80	1·10	·83	35½	·62
„	9	3½×3 ×½	3·001	10 20	·325	·225	1·11	·867	3·40	2·28	1·42	1·07	35½	·61
„	9	3½×3 ×⅝	3·673	12·49	·325	·225	1·16	·912	4·05	2·71	1·73	1·30	35	·61
„	8	3½×2½×¼	1·44	4·90	·30	·20	1·10	·602	1·76	·748	·73	·39	26½	·54
„	8	3½×2½×5/16	1·779	6·05	·30	·20	1·12	·627	2·15	·910	·90	·49	26½	·54
„	8	3½×2½×⅜	2·111	7·18	·30	·20	1·15	·652	2·52	1·06	1·07	·57	26	·53
„	8	3½×2½×½	2·752	9·36	·30	·20	1·20	·699	3·20	1·34	1·39	·74	26	·53
„	7	3 ×2½×¼	1·312	4·46	·275	·20	·895	·648	1·14	·716	·54	·39	34	·52
„	7	3 ×2½×5/16	1·62	5·51	·275	·20	·921	·673	1·39	·871	·67	·48	34	·52
„	7	3 ×2½×⅜	1·921	6·53	·275	·20	·945	·697	1·62	1·02	·79	·57	34	·52
„	7	3 ×2½×½	2·499	8·50	·275	·20	·992	·744	2·05	1·28	1·02	·73	33½	·52
„	6	3 ×2 ×¼	1·187	4·04	·275	·20	·976	·482	1·06	·373	·52	·25	23½	·43
„	6	3 ×2 ×5/16	1·464	4·98	·275	·20	1·00	·508	1·29	·452	·65	·30	23	·42
„	6	3 ×2 ×⅜	1·733	5·89	·275	·20	1·03	·532	1·50	·525	·76	·36	23	·42
„	6	3 ×2 ×½	2·249	7·65	·275	·20	1·07	·578	1·89	·656	·98	·46	22½	·42
„	5	2½×2 ×¼	1·063	3·61	·25	·175	·774	·527	·636	·359	·37	·24	32	·42
„	5	2½×2 ×5/16	1·309	4·45	·25	·175	·799	·552	·770	·433	·45	·30	31½	·42
„	5	2⅛×2 ×⅜	1·547	5·26	·25	·175	·823	·575	·895	·502	·53	·35	31½	·42
„	4	2 ×1½×3/16	·622	2·11	·225	·150	·627	·381	·240	·115	·17	·10	28½	·32
„	4	2 ×1½×¼	·814	2·77	·225	·150	·653	·407	·308	·146	·23	·13	28	·31
„	4	2 ×1½×5/16	·997	3·39	·225	·150	·678	·431	·369	·174	·28	·16	28	·31

Mild Steel Tees.



British Standard and Dorman Long's Special Sections.

Reference Marks B.S.T. and D.L.T.

Dimension and Properties in inch units.

Reference Mark.		Size and Thickness.	Area in Square Inches.	Weight per Foot in Lbs.	Radii. Table Root.	Radii. Table Toe.	Dimension J.	Moments of Inertia. About XX	Moments of Inertia. About YY	Section Moduli. About XX	Section Moduli. About YY	Radii of Gyration. About XX	Radii of Gyration. About YY
B.S.T.	21	6 ×4 ×⅜	3·634	12·36	·425	·300	·915	4·700	6·344	1·52	2·11	1·137	1·321
"	21	6 ×4 ×½	4·771	16·22	·425	·300	·968	6·070	8·621	2·00	2·87	1·128	1·344
"	21	6 ×4 ×⅝	5·878	19·99	·425	·300	1·02	7·350	10·912	2·47	3·64	1·118	1·362
"	20	6 ×3 ×⅜	..	11·10	..	..	..	..	..	..	..	..	..
"	20	6 ×3 ×½	4·272	14·53	·400	·275	·684	2·635	8·649	1·14	2·88	·785	1·423
"	19	5 ×4 ×⅜	3·257	11·07	·400	·275	·998	4·471	3·691	1·49	1·48	1·172	1·065
"	19	5 ×4 ×½	4·268	14·51	·400	·275	1·05	5·772	5·017	1·96	2·01	1·163	1·084
"	17	5 ×3 ×⅜	2·875	9·78	·350	·250	·691	1·973	3·716	·85	1·49	·828	1·137
"	17	5 ×3 ×½	3·762	12·79	·350	·250	·741	2·516	5·031	1·11	2·01	·818	1·156
"	15	4 ×4 ×⅜	2·872	9·77	·350	·250	1·11	4·189	1·901	1·45	·95	1·208	·814
"	15	4 ×4 ×½	3·758	12·78	·350	·250	1·16	5·402	2·590	1·90	1·29	1·199	·830
"	14	4 ×3 ×⅜	2·498	8·49	·325	·225	·767	1·860	1·914	·83	·96	·863	·875
"	14	4 ×3 ×½	3·262	11·08	·325	·225	·816	2·365	2·599	1·08	1·30	·851	·893
"	13	3½×3½×⅜	2·496	8·49	·325	·225	·988	2·768	1·284	1·10	·73	1·053	·717
"	13	3½×3½×½	3·259	11·08	·325	·225	1·04	3·543	1·752	1·44	1·00	1·043	·733
"	11	3 ×3 ×⅜	2·121	7·21	·300	·200	·868	1·708	·816	·80	·54	·897	·620
"	11	3 ×3 ×½	2·76	9·38	·300	·200	·918	2·165	1·115	1·04	·74	·886	·636
"	10	3 ×2½×⅜	1·929	6·56	·275	·200	·695	1·015	·814	·56	·54	·725	·650
"	10	3 ×2½×½	2·506	8·52	·275	·200	·742	1·275	1·109	·73	·74	·713	·665
"	8	2½×2½×¼	1·197	4·07	·275	·200	·697	·677	·302	·38	·24	·752	·502
"	8	2½×2½×5/16	1·474	5·01	·275	·200	·724	·823	·387	·46	·31	·747	·512
"	8	2½×2½×⅜	1·742	5·92	·275	·200	·750	·959	·473	·55	·38	·742	·521
"	7	2¼ × 2¼×¼	1·071	3·64	·250	·175	·638	·488	·224	·30	·20	·675	·457
"	7	2¼×2¼×⅜	1·554	5·28	·250	·175	·689	·685	·349	·44	·31	·664	·474
"	6	2 ×2 ×¼	·947	3·22	·250	·175	·579	·337	·157	·24	·16	·597	·407
"	6	2 ×2 ×⅜	1·367	4·64	·250	·175	·628	·469	·246	·34	·25	·586	·424
D.L.T.	6A	2 ×1½×¼	·820	2·79	·225	·150	·408	·148	·159	·14	·16	·425	·441
"	6A	2 ×1½×⅜	1·180	4·01	·225	·150	·455	·202	·246	·19	·25	·414	·457
B.S.T.	5	1½×2 ×¼	·820	2·79	·225	·150	·648	·307	·068	·23	·09	·612	·288
"	5	1½×2 ×5/16	1·003	3·41	·225	·150	·674	·369	·088	·28	·12	·607	·296
"	4	1¾×1¾×¼	·820	2·79	·225	·150	·519	·221	·107	·18	·12	·520	·361
"	4	1¾×1¾×5/16	·999	3·40	·225	·150	·544	·265	·137	·22	·16	·515	·370
"	3	1½×1½×3/16	·531	1·81	·200	·150	·435	·106	·048	·10	·06	·447	·301
"	3	1½×1½×¼	·692	2·35	·200	·150	·460	·135	·067	·13	·09	·442	·312

Weight of Round Steel Bars in lbs. per Lineal Foot.

Diameter in Inches.	0	⅛	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16
0	..	·042	·094	·167	·3610	·376	·5110	·669	·845	1·046	1·262	1·506	1·763	2·049	2·347
1	2·68	3·39	3·790	4·18	4·630	5·06	5·550	6·02	6·560	7·068	7·650	8·197	8·830	9·410	10·09
2	10·71	12·09	12·84	13·55	14·39	15·10	15·90	16·73	17·57	18·44	19·33	20·24	21·17	22·12	23·09
3	24·09	26·14		28·27		30·49		32·79		35·17		37·64		40·90	
4	42·83	45·54		48·35		51·23		54·20		57·25		60·39		63·61	
5	66·91	70·30		73·77		77·33		80·97		84·69		88·50		92·38	
6	96·36	100·4		104·6		108·8		113·1		117·5		122·0		126·5	
7	131·2	135·9		140·7		145·6		150·6		155·6		160·8		166·0	
8	171·3	176·7		182·2		187·7		193·4		199·1		204·9		210·8	
9	216·8	222·9		229·0		235·2		241·6		248·0		254·4		261·0	
10	267·7	274·4		281·2		288·1		295·1		302·2		309·3		316·5	
11	323·9	331·3		388·3		346·3		354·0		361·7		369·5		377·4	
12	385·4	393·5		401·7		409·9		418·2		426·6		435·1		443·7	
13	452·3	461·1		469·9		478·8		487·8		496·9		506·0		515·3	
14	524·6	534·0		543·5		553·1		562·8		572·5		582·3		592·2	

Add 10 per cent· for High Speed Steel.

Weight of Square Steel Bars in lbs. per Lineal Foot.

Size of Square in Inches.	0	⅛	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16
0	..	·053	·1198	·213	·3320	·479	·6510	·852	1·076	1·331	1·607	1·917	2·245	2·609	2·988
1	3·408	4·313	4·810	5·325	5·880	6·443	7·050	7·668	8·330	8·999	9·720	10·44	11·21	11·98	12·81
2	13·63	15·39	16·30	17·25	18·22	19·22	20·24	21·30	22·37	23·48	24·61	25·77	26·95	28·17	29·40
3	30·67	33·28		36·00		38·82		41·75		44·78		47·92		51·17	
4	54·53	57·99		61·56		65·23		69·01		72·90		76·89		80·99	
5	85·20	89·51		93·93		98·46		103·1		107·8		112·7		117·6	
6	122·7	127·9		133·1		138·5		144·0		149·6		155·3		161·1	
7	167·0	173·0		179·1		185·4		191·7		198·1		204·7		211·3	
8	218·1	225·0		232·0		239·0		246·2		253·5		260·9		268·4	
9	276·0	283·8		291·6		299·5		307·6		315·7		324·0		332·3	

Add 10 per cent· for High Speed Steel.

Weight of Octagon Steel Bars in lbs. per Lineal Foot.

Size in Inches.		Size in Inches.		Size in Inches.	
¼	·18	1 1/16	3·25	1⅞	10·12
5/16	·28	1⅛	3·64	1 15/16	10·81
⅜	·41	1 3/16	4·06	2	11·51
7/16	·45	1¼	4·50	2⅛	13·00
½	·72	1 5/16	4·96	2¼	14·58
9/16	·91	1⅜	5·45	2⅜	16·24
⅝	1·12	1 7/16	5·95	2½	18·00
11/16	1·36	1½	6·48	2⅝	19·84
¾	1·62	1 9/16	7·03	2¾	21·78
13/16	1·90	1⅝	7·61	2⅞	23·80
⅞	2·20	1 11/16	8·20	3	25·92
15/16	2·53	1¾	8·82		
1	2·87	1 13/16	9·46		

Weight of Hexagonal Steel Bars in lbs. per Lineal Foot.

Size in Inches.		Size in Inches.		Size in Inches.	
¼	·19	1 1/16	3·37	1⅞	10·50
5/16	·19	1⅛	3·78	1 15/16	11·21
⅜	·42	1 3/16	4·21	2	11·95
7/16	·57	1¼	4·66	2⅛	13·49
½	·75	1 5/16	5·14	2¼	15-12
9/16	·94	1⅜	5·65	2⅜	16·85
⅝	1·17	1 7/16	6·17	2½	18·66
11/16	1·41	1½	6·72	2⅝	20·58
¾	1·68	1 9/16	7·29	2¾	22·59
13/16	1·97	1⅝	7·89	2⅞	24·69
⅞	2·29	1 11/16	8·50	3	26·88
15/16	2·62	1¾	9·14		
1	2·99	1 13/16	9·81		

Add 10 per cent. for High Speed Steel.

Weight of Flat Rolled Steel Bars

In lbs. per Lineal Foot.

Width in Inches.	Thickness in Inches.										
	⅛	3/16			⅜			⅝		⅞	
	·213	·319	·425	·532	·638	·745	·850	1·06	1·28	1·49	1·70
⅝	·266	·399	·531	·665	·797	·931	1·06	1·33	1·59	1·86	2·13
¾	·319	·479	·639	·798	·956	1·12	1·28	1·59	1·91	2·23	2·55
⅞	·372	·559	·744	·931	1·12	1·31	1·49	1·86	2·23	2·60	2·98
1	·425	·638	·850	1·06	1·28	1·49	1·70	2·13	2·55	2·98	3·40
1¼	·531	·797	1·06	1·33	1·59	1·86	2·13	2·66	3·19	3·72	4·25
1½	·638	·956	1·28	1·59	1·91	2·23	2·55	3·19	3·83	4·46	5·10
1¾	·744	1·12	1·49	1·86	2·23	2·60	2·98	3·72	4·46	5·21	5·95
	·850	1·28	1·70	2·13	2·55	2·98	3·40	4·25	5·10	5·95	6·80
	·956	1·43	1·91	2·39	2·87	3·35	3·83	4·78	5·74	6·69	7·65
2½	1·06	1·59	2·13	2·66	3·19	3·72	4·25	5·31	6·38	7·44	8·50
2¾	1·17	1·75	2·31	2·92	3·51	4·09	4·68	5·84	7·01	8·18	9·35
3	1·28	1·91	2·55	3·19	3·83	4·46	5·10	6·38	7·65	8·93	10·20
3¼	1·38	2·07	2·76	3·45	4·14	4·83	5·53	6·91	8·29	9·67	11·05
3½	1·49	2·23	2·98	3·72	4·46	5·21	5·95	7·44	8·93	10·41	11·90
3¾	1·59	2·39	3·19	3·98	4·78	5·58	6·38	7·97	9·56	11·16	12·75
4	1·70	2·55	3·40	4·25	5·10	5·95	6·80	8·50	10·20	11·90	13·60
4¼	1·81	2·71	3·61	4·52	5·42	6·32	7·23	9·03	10·84	12·64	14·45
4½	1·91	2·87	3·83	4·78	5·74	6·69	7·65	9·56	11·46	13·39	15·30
4¾	2·02	3·03	4·04	5·05	6·06	7·07	8·08	10·09	12·11	14·13	16·15
5	2·13	3·19	4·25	5·31	6·38	7·44	8·50	10·63	12·75	14·88	17·00
5¼	2·23	3·35	4·46	5·58	6·69	7·81	8·93	11·16	13·39	15·62	17·85
5½	2·34	3·51	4·68	5·84	7·01	8·18	9·35	11·69	14·03	16·36	18·70
5¾	2·44	3·67	4·89	6·11	7·33	8·55	9·78	12·22	14·66	17·11	19·55
	2·55	3·83	5·10	6·38	7·65	8·93	10·20	12·75	15·30	17·85	20·40
6¼	2·66	3·98	5·31	6·64	7·97	9·30	10·63	13·28	15·94	18·59	21·25
6½	2·76	4·14	5·53	6·91	8·29	9·67	11·05	13·81	16·58	19·34	22·10
6¾	2·87	4·30	5·74	7·17	8·61	10·04	11·48	14·34	17·21	20·08	22·95
7	2·98	4·46	5·95	7·44	8·93	10·41	11·90	14·88	17·85	20·83	23·80
7¼	3·08	4·62	6·16	7·70	9·24	10·78	12·33	15·41	18·49	21·57	24·65
7½	3·19	4·78	6·38	7·97	9·56	11·16	12·75	15·94	19·13	22·31	25·50
7¾	3·29	4·94	6·59	8·23	9·88	11·53	13·18	16·47	19·76	23·06	26·35
8	3·40	5·10	6·80	8·50	10·20	11·90	13·60	17·00	20·40	23·80	27·20
8¼	3·51	5·26	7·01	8·77	10·52	12·27	14·03	17·53	21·04	24·54	28·05
8½	3·61	5·42	7·23	9·03	10·84	12·64	14·45	18·06	21·68	25·29	28·90
8¾	3·72	5·58	7·44	9·30	11·16	13·02	14·88	18·59	22·31	26·03	29·75

Add 10 per cent. for High Speed Steel.

Weight of Flat Rolled Steel Bars

In lbs. per Lineal Foot.

Width in Inches.	Thickness in Inches.										
	⅛	3/16	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1
9	3·83	5·74	7·65	9·56	11·48	13·39	15·30	19·13	22·95	26·78	30·60
9¼	3·93	5·90	7·86	9·83	11·80	13·76	15·73	19·66	23·59	27·52	31·45
9½	4·04	6·06	8·08	10·09	12·11	14·13	16·15	20·19	24·23	28·26	32·30
9¾	4·14	6·22	8·29	10·36	12·43	14·50	16·58	20·72	24·86	29·01	33·15
10	4·25	6·38	8·50	10·63	12·75	14·88	17·00	21·25	25·50	29·75	34·00
10¼	4·36	6·53	8·71	10·89	13·07	15·25	17·43	21·78	26·14	30·49	34·85
10½	4·46	6·70	8·93	11·16	13·39	15·62	17·85	22·31	26·78	31·24	35·70
10¾	4·57	6·85	9·14	11·42	13·71	15·99	18·28	22·84	27·41	31·98	36·55
11	4·68	7·01	9·35	11·69	14·03	16·36	18·70	23·38	28·05	32·73	37·40
11¼	4·78	7·17	9·56	11·95	14·34	16·73	19·13	23·91	28·69	33·47	38·25
11½	4·89	7·33	9·78	12·22	14·66	17·11	19·55	24·44	29·33	34·21	39·10
11¾	5·00	7·49	9·99	12·48	14·98	17·48	19·98	24·97	29·96	34·96	39·95
12	5·10	7·65	10·20	12·75	15·30	17·85	20·40	25·50	30·60	35·70	40·80
13	5·53	8·29	11·05	13·81	16·58	19·34	22·10	27·63	33·15	38·68	44·20
14	5·95	8·93	11·90	14·88	17·85	20·83	23·80	29·75	35·70	41·65	47·60
15	6·38	9·56	12·75	15·94	19·13	22·31	25·50	31·88	38·25	44·63	51·00
16	6·80	10·20	13·60	17·00	20·40	23·80	27·20	34·00	40·80	47·60	54·40
17	7·23	10·84	14·45	18·06	21·68	25·29	28·90	36·13	43·35	50·58	57·80
18	7·65	11·48	15·30	19·13	22·95	26·78	30·60	38·25	45·90	53·55	61·20
19	8·08	12·11	16·15	20·19	24·23	28·26	32·30	40·38	48·45	56·53	64·60
20	8·50	12·75	17·00	21·25	25·50	29·75	34·00	42·50	51·00	59·50	68·00
21	8·93	13·39	17·85	22·31	26·78	31·24	35·70	44·63	53·55	62·48	71·40
22	9·35	14·03	18·70	23·38	28·05	32·72	37·40	46·75	56·10	65·45	74·80
23	9·78	14·66	19·55	24·44	29·33	34·21	39·10	48·88	58·65	68·43	78·20
24	10·20	15·30	20·40	25·50	30·60	35·70	40·80	51·00	61·20	71·40	81·60
25	10·63	15·94	21·25	26·56	31·88	37·19	42·50	53·13	63·75	74·38	85·00
26	11·05	16·58	22·10	27·63	33·15	38·68	44·20	55·25	66·30	77·35	88·40
27	11·48	17·21	22·95	28·69	34·43	40·16	45·90	57·38	68·85	80·33	91·80
28	11·90	17·85	23·80	29·75	35·70	41·65	47·60	59·50	71·40	83·30	95·20
29	12·33	18·49	24·65	30·81	36·98	43·14	49·30	61·63	73·95	86·28	98·60
30	12·75	19·13	25·50	31·88	38·25	44·63	51·00	63·75	76·50	89·25	102·00
31	13·18	19·76	26·35	32·94	39·53	46·11	52·70	65·88	79·05	92·23	105·40
32	13·60	20·40	27·20	34·00	40·80	47·60	54·40	63·00	81·60	95·20	108·80
33	14·03	21·04	28·05	35·06	42·08	49·09	56·10	70·13	84·15	98·18	112·20
34	14·45	21·68	28·90	36·13	43·35	50·58	57·80	72·25	86·70	101·15	115·60
35	14·88	22·31	29·75	37·19	44·63	52·06	59·50	74·38	89·25	104·13	119·00
36	15·30	22·95	30·60	38·25	45·90	53·55	61·20	76·50	91·80	107·10	122·40

Add 10 per cent. for High Speed Steel.

Wrought-Iron.

A sub-committee of the British Engineering Standards Association was appointed some years ago to recommend standards of quality of Wrought-Iron for use in Railway Rolling Stock.

This committee did not consider it desirable to perpetrate such terms as "Treble Best," "Best Best" and "Best" as applied to Staffordshire Iron. They were of the opinion that it was preferable to indicate the best practice by suitable tests for each grade of iron. The sub-committee considered that four grades would meet all general requirements for Wrought Iron for use in Railway Rolling Stock and they recommended accordingly that the Standard grades should be known as "Best Yorkshire," Grade "A," Grade "B" and Grade "C." The report was duly approved and adopted.

We shall be pleased to obtain the Standard Specifications which are now in general use for iron for other purposes and supply them to our constituents at a small charge.

We carry stocks of many of the principal sizes of Wrought-Iron of "Best Yorkshire" and Grade "A" qualities. We can usually supply soft mild Steel of special qualities that will fulfil the uses to which Wrought-Iron is often used.

Grade "A" Iron. Flat, Round and Square.

To British Standard Specification for Wrought-Iron for use in Railway Rolling Stock.

All Sizes in Inches.
Weights in lbs. per foot.

Flat Iron.

¾	× ¼	·62 lbs.	1½	× ½	2·50 lbs.	1¾	× ¾	4·37 lbs.
1		·83 „	1¾		2·92 „	2		5·00 „
1¼		1·04 „	2		3·33 „	3		7·50 „
1½		1·25 „	2½		4·17 „	3¾		9·37 „
2		1·67 „	3		5·00 „	4		10·02 „
2½		2·08 „	3½		5·83 „	6½		16·25 „
3		2·50 „	5		8·33 „	1¾	× 1	5·83 „
						2		6·67 „
						2½		8·33 „
						3		10·00 „
1	× ⅜	1·25 „				3	× 1¼	12·52 „
1¼		1·56 „				4	× 1	13·33 „
1½		1·87 „	1¼	× ⅝	2·60 „	4	× 1¼	16·7 „
2		2·50 „	1½		3·12 „	3	× 1½	15·00 „
2½		3·12 „	2		4·17 „	3	× 2	20·00 „
3		3·75 „	2½		5·21 „	4½	× 2	30·00 „
5		6·25 „	3		6·25 „	4	× 3	40·08 „

Price Rs. 15.0 per cwt.

Round Iron. Size in Inches.	Round Iron. Weight per ft.	Square Iron. Size in Inches.	Square Iron. Weight per ft.
⅜	·368 lbs.	1¼	5·21 lbs.
½	·654 „	2	13·33 „
⅝	1·04 „	2¼	16·87 „
¾	1·47 „	2½	20·83 „
⅞	2·04 „	2¾	25·62 „
1	2·62 „	4	53·33 „
2½	16·36 „	4½	67·63 „
3¾	36·18 „		
Price, Rs. 15-0 per cwt.		**Price, Rs. 15-0** per cwt.	

Yorkshire Iron—Flat 5×3×50.1 lbs. **Rs. 36-0** per cwt.

Mild Steel Hoops.

Thickness.	Width in inches and weight per ft. in lbs. ¾"	1"	1½"	2"	2½"	3"	Price.
20 B. W. G. ..	·100	·133	·200	.266	·333	·399	Rs. 15-0 per cwt.
18 „ ..	·126	·168	·252	·337	·427	·504	
17 „ ..	·142	·189	·284	·378	·473	·567	
16 „ ..	·159	·213	·319	·425	·531	·638	
12 „ ..	·253	·337	·505	·674	·842	1·011	

Best Varnished Mild-Steel Hoop for Gunny Baling 1"×16G **Rs. 16-0** per cwt.

Galvanized Flat Iron Wind Ties.

Stock Sizes, 1¼"×³⁄₁₆", 1¼"×¼", 1½"×¼", 2"×¼", Rs. 24-0 per cwt.

Panel Plates.

We shall be glad to receive enquiries for English Mild Steel Planished Panel Plates. We can quote against specifications for any required sizes. The plates we import are manufactured by first class British makers. They are cut exact to size, square on edges, cold hammered and level, and are supplied oiled and carefully packed in crates.

We have in the past executed large contracts for Indian Railways for Panel Plates.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

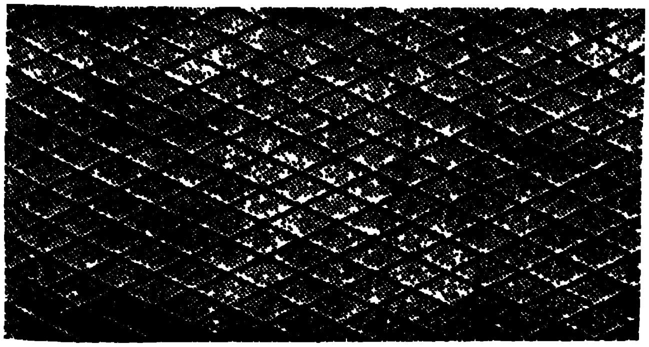
Mild Steel Sheets and Plates.

Best British Shipbuilding Quality.

Prices per cwt.

SIZE.	THICKNESS.													
Length and Breadth.	24G.	22G.	20G.	18G.	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.
6'×2'-0" 6'×2'-6" 6'×3'-0" 6'×4'-0" 7'×2'-6" 7'×3'-0" 7'×4'-0" 8'×2'-6" 8'×3'-0" 8'×3'-6" 8'×4'-0"	16 0	16 0	16 0	16 0	13 8	12 0	12 0	11 8					11 8	12 0
9'×3'-0" 9'×4'-0" 10'×3'-0" 10'×3'-6" 10'×4'-0" 10'×5'-0" 12'×3'-0" 12'×3'-6" 12'×4'-0" 12'×5'-0" 12'×6'-0"	..	..	..	16 8	14 8	13 0	12 8	11 8					12 0	..
14'×4'-0" 16'×4'-0" 16'×6'-0"	..	..	..	..	..	..	..	11 8	..	11 8	..	..	..	..
Weight per Square ft. in lbs.	1 01	1·27	1·59	2·04	2·55	5·10	7·65	10·2	12·75	15·3	20·4	25·5	30·6	40·8

Mild Steel Chequered Plates.



Mild steel chequered plates, small Diamond Pattern, for engine room flooring, cupola staging, Trench covers, etc., are stocked in the following sizes:— 6"×3"×1/4" and 6"×4"×1/4".

Rs. 19-0 per cwt.

We can also quote for any lengths, widths, and shapes for forward delivery, to suit customers' requirements.

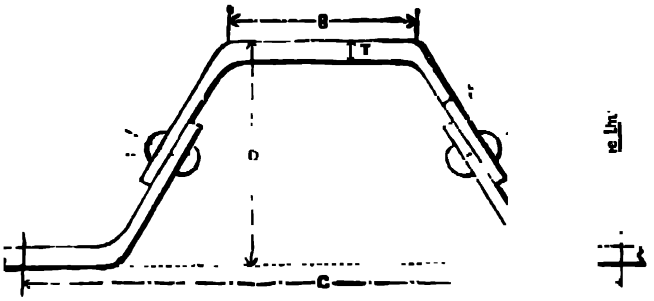
Cast-Iron Chequered Plates. Made in any size or style to suit customers' requirements at .. .. **Rs. 14-0** per cwt.

Russian Steel Lagging Sheets.

Planished and blued. **Prices on application.**

Steel Troughing.

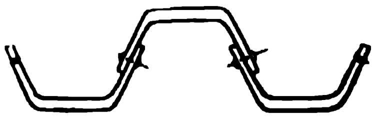
Manufactured by Messrs. Dorman Long & Co., Ltd.



For dimensions, etc., see pages 273 and 274.

Troughing commands a leading place on the market and can be recommended for a variety of purposes. When used for road bridges it not only affords a water-tight superstructure for carrying the road metalling, but in most cases dispenses with the use of cross girders and frequently with the main girders also. In railway bridges it frequently takes the place of cross girders, rail-bearers and timber planking, at the same time forming a safer floor in case of derailment. A maximum amount of headway under the bridge is attained and a saving in cost effected. The smaller sections will be found especially useful for the decking of piers, floors of warehouses ceilings of subways, strong rooms, etc.

The Troughing is usually riveted in sections of three, thus:—



The site connections are generally made with rivets, but bolted connections may be adopted when found advisable, either method affording easy means of erection.

Single Troughs are frequently used as roof gutters, and permit of the supports being placed at long distances apart.

The tabular loads given in the next two pages include the weight of the troughing itself and are calculated from the section modulus of the width " c " shown in the diagram. They are based on an extreme fibre of 6½ tons per square inch.

Steel Troughing.

Manufactured by Messrs. Dorman Long & Co. Ld.

Dimensions and Properties.

See sketch on opposite page.

Reference Mark.	Weight per sq. ft. of covered area.	Centres. C		Depths. D		Width of Flange.	Thickness of Flange.	Thickness of Web	RIVETS. Dia.	RIVETS. Pitch.	Section Modulus for width "C."
	lbs.	Ft.	Ins.	Ft.	Ins.	Ins.	Ins.	Ins.	Ins	Ins.	
D. Max.	51·83	2	8	1	1	9	1·000	·636	¾	4	135·80
D Med.	40·50	2	8	1	0½	9	·756	·508	¾	4	103·54
D Min.	28·78	2	8	1	0	9	·500	·367	¾	4	72·67
C^1 Max.	35 02	2	0	0	9⅜	7½	·625	·401	¾	4	51·45
C^1. Min.	26·26	2	0	0	9	7½	·438	·307	¾	4	36·57
C Max.	32·97	1	8	0	7⅜	6	·616	·400	⅝	4	30·60
C Min.	24·52	1	8	0	7	6	·438	·300	⅝	4	21·62
B Max.	28·00	1	4	0	6¼	5⅛	·503	·304	⅝	4	17·50
B Min.	21·80	1	4	0	6	5⅛	·375	·240	⅝	4	13·50
A Max	23·10	1	2	0	5¼	4½	·453	·247	½	4	11·05
A. Min.	17·61	1	2	0	5	4½	·336	·188	½	4	8·40
O. Max.	18·84	1	0	0	4¼	4	·370	·193	½	4	6·48
O. Min.	15·32	1	0	0	4⅛	4	·297	·156	½	4	5·27

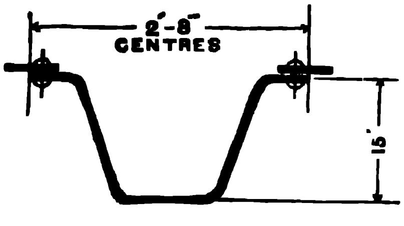
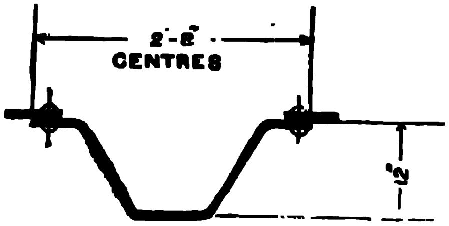
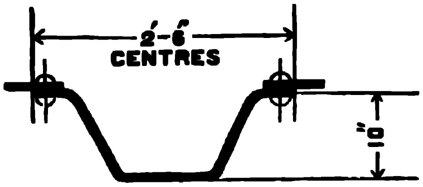
Safe Loads in Cwts. per Square Foot.

Reference Mark.	Span in Feet. 6	8	10	12	14	16	18	20	22	24	26	28	30	32
D. Max.	...	...	44·1	30·6	22·5	17·2	13·6	11·0	9·1	7·7	6·5	5·6	4·9	4·3
D. Med.	...	...	33·7	23·4	17·2	13·1	10·4	8·4	7·0	5·8	5·0	4·3	3·7	3·3
D Min.	...		23·6	16·4	12·0	9·2	7·3	5·9	4·9	4·1	3·5	3·0	2·6	...
C^1 Max.	...	...	22·3	15·5	11·4	8·7	6·9	5·6	4·6	3·9	...	...	...	...
C^1. Min.	...	...	15·8	11·0	8·1	6·2	4·9	4·0	3·3	...	...		...	...
C Max.	...	24·8	15·9	11·0	8·1	6·2	4·9	...	...	...	...	...	...	...
C Min.	...	17·6	11·2	7·8	5·7	4·4	3·5	...	...		...	...	...	...
B. Max.	31·6	17·8	11·4	7·9	5·8	4·4	...	...	...		...	...	...	...
B Min.	24·4	13·7	8·8	6·1	4·5	3·4	...	...	...	...	...	...	...	...
A Max.	22·8	12·8	8·2	5·7	4·2	...	...	...	...	...	...	...	...	...
A Min.	17·3	9·7	6·2	4·3	3·2	...	...	...		...	...		...	...
O Max.	15·6	8·8	5·6	3·9	...	...	...	...		...		...	...	...
O. Min.	12·7	7·2	4·6	3·2	...	...	...	...	...	...	...	...	...	...

Safe Distributed Loads in Tons for Width "C."

Reference Mark.	Span in Feet. 6	8	10	12	14	16	18	20	22	24	26	28	30	32
D. Max.	...	...	58·8	49·0	42·0	36·8	32·7	29·4	26·7	24·5	22·6	21·1	19·6	18·4
D. Med.	...	...	44·9	37·4	32·1	28·0	24·9	22·4	20·4	18·7	17·2	16·0	14·9	14·0
D. Min.	...	...	31·5	26·2	22·5	19·7	17·5	15·7	14·3	13·1	12·1	11·2	10·5	...
C^1. Max.	...	...	22·3	18·6	15·9	13·9	12·4	11·1	10·1	9·3	...	...	...	...
C^1. Min.	...	...	15·8	13·2	11·3	9·9	8·8	7·9	7·2	...	...	...	...	...
C. Max.	...	16·6	13·3	11·0	9·5	8·3	7·4	...	...	...	...	...	...	...
C. Min.	...	11·7	9·4	7·8	6·7	6·8	5·2	...	...	...	...	...	...	...
B Max.	12·6	9·5	7·6	6·3	5·4	4·7	...	...	...	...	...	...	...	...
B. Min.	9·7	7·3	5·8	4·9	4·2	3·6	...	...	...	...	...	...	...	...
A. Max.	8·0	6·0	4·8	4·0	3·4	...	...	...	...	...	...	...	...	...
A. Min.	6·1	4·5	3·6	3·0	2·6	...	...	...	...	...	...	...	...	...
O. Max.	4·7	3·5	2·8	2·3	...	...	...	...	...	...	...	...	...	...
O. Min.	3·8	2·9	2·3	1·9	...	...	...	...	...	...	...	...	...	...

Westwood's Corrugated Steel Flooring.

ILLUSTRATIONS.	Veight per square foot o area covered.	kness plate.	ximum leng	oment o ance in	Safe distributed loads per square foot of area covered. Span. 10′	15′	20′	25′	30′
	Lbs.	In		Tons.	Cwts	Cwts.	Cwts	Cwts	Cwts.	Cwts
 	28·36	4/8		536·25	26·88	18·66	11·94	6·72	4·30	2·98
	33·00	1/8		625·63	31·29	21·73	13·90	7·82	5·00	3·47
	37·50			715·00	35·75	24·82	15·88	8·94	5·72	3·97
	42·14			804·38	40·21	27·92	17·83	10·05	6·43	4·47
	46·63			893·75	44·69	31·03	19·86	11·17	7·15	4·97
	51·20			983·13	49·16	34·13	21·84	12·29	7·86	5·47
	55·72			1072·50	53·64	37·25	23·84	13·41	8·58	5·97
 	25·92	4/8	30	382·69	19·13	13·29	8·50	4·78	3·06	2·12
	30·00			446·47	22·32	15·50	9·90	5·58	3·57	2·48
	34·17			510·25	25·52	17·72	11·34	6·38	4·08	2·84
	38·32			574·03	28·70	20·00	12·75	7·20	4·59	3·20
	42·47			637·81	31·89	22·15	14·17	7·97	5·10	3·54
	46·62			701·59	35·07	24·36	15·59	8·79	5·61	3·89
	50·75			763·37	38·27	26·58	17·00	9·57	6·12	4·25
 	25·66		30	329·06	17·55	12·19	7·80	4·38	2·80	1·95
	29·76			383·90	20·47	14·21	9·09	5·12	3·27	
	33·86			438·75	23·40	16·25	10·40	5·85	3·74	2·60
	37·96			493·59	26·32	18·28	11·70	6·58	4·21	2·92
	42·06			548·43	29·25	20·31	13·00	7·31	4·68	3·25
	46·16			603·27	32·18	22·35	14·30	8·04	5·15	3·57
	50·26			658·13	35·10	24·37	15·60	8·77	5·61	3·90

All calculations are based on a working stress of 6½ tons per square inch. To suit special requirements the above sections can be varied in width a few inches.

Cover strips are used in the connections of all the above sections.

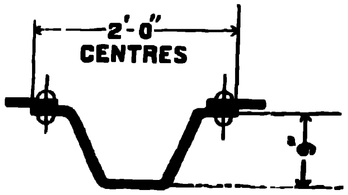
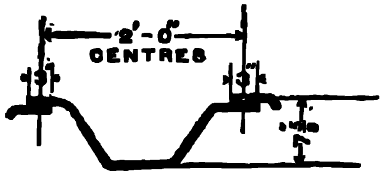
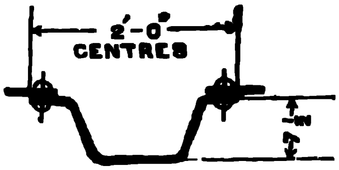
Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

ESSOP & Co. Ltd.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Westwood's Corrugated Steel Flooring.

ILLUSTRATIONS.	Section.	Weight per square foot of area covered.	Thickness of plate.	Maximum length without joint.	Moment of resistance in inch-Tons.	Safe distributed loads per square foot of area covered. Span. 10′	12′	15′	20′	25′	30′
		Lbs.	In.	Ft.	Tons.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
	D	28·13	⅜	30	258·58	17·24	11·97	7·66	4·31	2·70	1·91
	„	32·62	7/16	„	301·67	20·11	13·96	8·93	5·02	3·22	2·22
	„	37·06	½	„	344·76	22·98	15·95	10·21	5·74	3·68	2·56
	„	41·52	9/16	„	387·85	25·86	17·95	11·50	6·46	4·40	2·87
	„	45·98	⅝	„	430·94	28·73	19·95	12·78	7·18	4·60	3·20
	„	50·46	11/16	„	471·03	31·60	21·95	14·07	7·90	5·06	3·52
	„	54·92	¾	„	517·12	34·47	23·93	15·33	8·61	5·52	3·83
	E	22·41	⅜	30	172·25	11·48	8·00	5·10	2·87	1·83	1·27
	„	26·08	7/16	„	200·95	13·33	9·30	5·93	3·35	2·14	1·48
	„	29·75	½	„	229·64	15·20	10·62	6·88	3·80	2·43	1·70
	„	33·41	9/16	„	258·34	17·22	12·00	7·60	4·30	2·75	1·90
	„	37·08	⅝	„	287·05	19·13	13·28	8·46	4·80	3·06	2·11
	„	40·75	11/16	„	315·75	21·05	14·61	9·35	5·26	3·36	2·34
	„	44·41	¾	„	344·46	22·96	15·94	10·20	5·74	3·67	2·55
	F	25·80	⅜	25	201·48	13·43	9·32	5·96	3·36	2·14	1·49
	„	29·96	7/16	„	235·06	15·67	10·88	6·96	3·92	2·50	1·74
	„	34·10	½	„	268·64	17·91	12·43	7·96	4·48	2·86	1·99
	„	38·26	9/16	„	302·22	20·15	14·00	8·95	5·04	3·28	2·24
	„	42·41	⅝	„	335·80	22·38	15·54	9·94	5·59	3·58	2·48
	„	46·58	11/16	„	369·38	24·62	17·10	10·94	6·15	3·94	2·73
	„	50·71	¾	„	402·96	26·86	18·65	11·93	6·71	4·29	2·98

Cover strips are used in the connections of sections D and F.
All calculations are based on a working stress of 6½ tons per square inch.
To suit special requirements the above sections can be varied in width a few inches.

Prices on application.

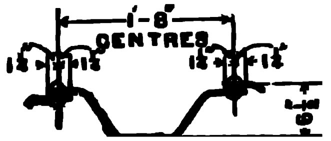
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

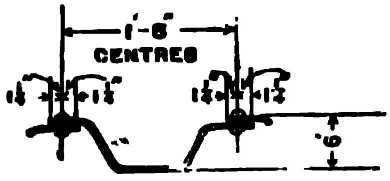
JESSOP & Co. Ltd

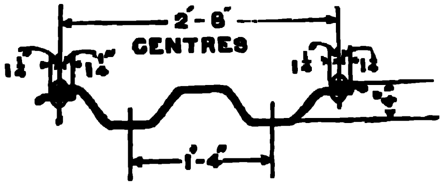
RANGOON, MADRAS,
BOMBAY, LONDON.

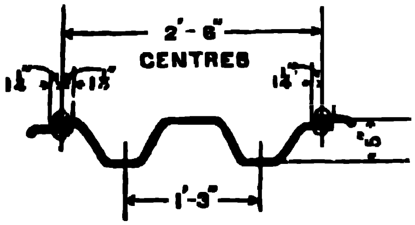
Westwood's Corrugated Steel Flooring.

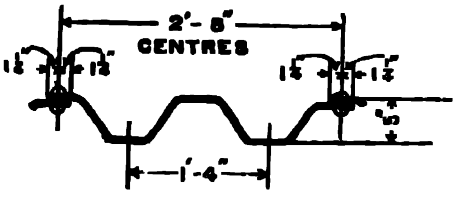
ILLUSTRATIONS.

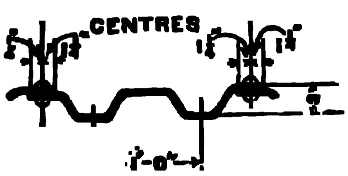












Weight pe square foot of area covered.	Thicknes plate	Maximum leng without joint	M en of re ice n inch	Safe distributed loads per square foot of area covered.						
				Span.						
								10'	12'	
Lbs.			Tons	Cwt	Cwts.	Cwts.	Cwt	Cwts	Cwts.	
15·48			86·4	27·6	19·2	10·85	6·9	4·80	3·07	
19·20			108·00	34·5	24·00	13·51	8·6	6·00	3·84	
23·00			129·6	41·5	28·82	16·21	10·3	7·21	4·61	
26·68			151·2	48·4	33·62	18·91	12·1	8·40	5·38	
30·40	½		172·9	55·3	38·43	21·62	13·8	9·61	6·15	
H 15·48		20	74·1	23·7	16·47	9·26	5·9	4·12	2·64	
19·20			92·6	29·6	20·59	11·62	7·4	5·15	3·29	
23·00			111·5	35·5	24·71	13·90	8·8	6·18	3·95	
26·68			129·6	41·5	28·82	16·21	10·38	7·20	4·61	
30·40			148·2	47·44	32·94	18·53	11·86	8·23	5·27	
10·77		25	71·60	14·32	9·95	5·60	3·58	2·49	1·59	
14·27			95·55	19·1	13·27	7·46	4·78	3·32	2·12	
17·73			119·44	23·88	16·58	9·32	5·97	4·14	2·65	
21·25	⅜		143·33	28·66	19·90	11·20	7·10	4·98	3·18	
11·31		25	71·96	15·34	10·65	5·99	3·83	2·66	1·70	
14·94			95·94	20·46	14·21	7·99	5·11	3·55	2·27	
18·62			119·92	25·58	17·76	9·99	6·39	4·44	2·84	
22·28	⅜		143·90	30·69	21·3	11·99	7·67	5·33	3·41	
10·57	3/16	33	62·89	2·57	8·73	4·91	3·14	2·18	1·39	
13·95			83·85	6·77	11·64	6·55	4·19	2·91	1·86	
17·36	5/16		104·81	20·96	4·55	8·18	5·24	3·64	2·33	
20·76	⅜		125·77	25·16	7·47	9·82	6·29	4·37	2·79	
10·63	3/16	20	32·32	8·62	5·98	3·37	2·15	1·49	0·96	
14·03	¼		43·09	1·48	7·97	4·48	2·87	1·99	1·27	
17·43	5/16		53·86	4·36	9·98	5·61	3·59	2·49	1·59	

All calculations are based on a working stress of 6½ tons per square inch.
To suit special requirements the above sections can be varied in width a few inches.

Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,
JESSOP & Co. Ltd
ENGINEERS
RANGOON, MADRAS,
BOMBAY, LONDON.

Non-Ferrous Metals.

The following remarks are of general application for the preparation of indents for commercial qualities of the commoner non-ferrous metals.

Aluminium.—98.5 per cent. pure. Traces only of sodium. Silicon not to exceed 0.5 per cent.

Ingot.—In notched bars each division not exceeding 6 ozs.

Sheet.—Weight per square foot, 1 in. thick, 14 lbs. Demands should state whether sheet is required "Hard Rolled," "Medium Hard" or "Soft."

Antimony.—Not more than one per cent. impurities. In cakes of about 40 lbs.

Brass.—In an alloy of copper or zinc, the former being shown first in expressing the constitution. The copper element is specified to be 99.5 per cent. pure. The alloys specified are as follows:—

Bars above $\frac{5}{16}$ in. dia. or section .. .. 60|40.

Bars $\frac{5}{16}$ in. dia. or section and under .. .. 65|35.

Many other alloys are made including several containing small added elements of Manganese, Tin Aluminium, etc., of which the best known is "Delta Metal No. 4" containing a small portion of iron, etc. This is the alloy supplied if "Delta Metal" is demanded, but several other "Delta Metals" are made and for producing sections by extrusion the composition frequently includes 2 per cent. of lead, with a copper content not exceeding 60. Stock sizes of Extruded Brass Rods—

Round, Ins. ¼, ⅜, ½, ⅝, ¾, ⅞, 1, 1¼, 1½, 1¾, 2	**As. 12**	per lb.
Hexagonal, Ins. ⅜, ½, ⅝, ¾, 1, 1¼, 1½, 1¾, 2, 2¼, 2½, 2¾ and 3	**Re. 1-0**	„ „

Copper.—99.5 per cent. pure.

Ingot.—14 lbs. nicked in centre or in bar of 80 lbs. with three nicks.

Lead—Sheet.—Demands should specify width, weight per superficial foot or thickness. Stocked in rolls 30 ins. by 7 ins. by $\frac{1}{16}$ in. $\frac{3}{32}$ in. and ⅛ in. thick.

Ingot.—Pure virgin lead, in 1 cwt. slabs.

Nickel.—Is obtainable in cubes, roundels, pellets, grain and ingot as well as in manufactured form. It is used mainly in alloys. Nickel silver consists of copper, zinc and nickel in varying proportions, it is also termed "German silver," "Electrum," and "White metal."

Tin.—Ingots of 14 and 28 lbs. Ordinary—Impurities not to exceed 0.7 per cent. Refined—Impurities not to exceed 0.3 per cent.

Zinc.—Spelter, *i.e.*, Cakes of 1 in. or more thick, weight about 56 lbs.

Sheets rolled, stock sizes, 8 by 3 by 19 B.W.G., 8 by 4 by 19 B.W.G., 7 by 3 by 20 B.W.G.

Zinc Sheet.—The thickness should be given in demands in terms of standard wire gauge (S.W.G.) and not in terms of the Belgian zinc gauge, (or zinc gauge).

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS.

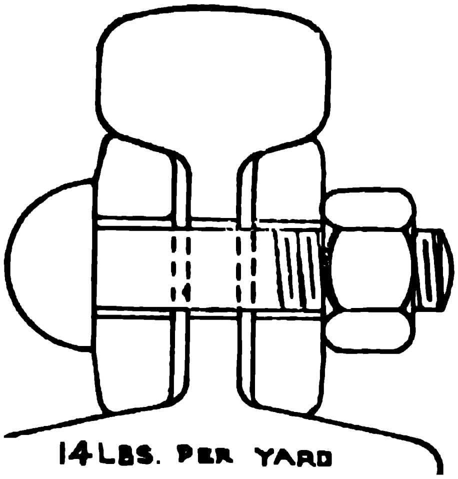
RANGOON, MADRAS,
BOMBAY, LONDON.

Light Railway Equipment.

The illustrations of Light Railway Equipment are not intended to be binding in all details, as designs are constantly being improved, and weights are to be taken as approximate.

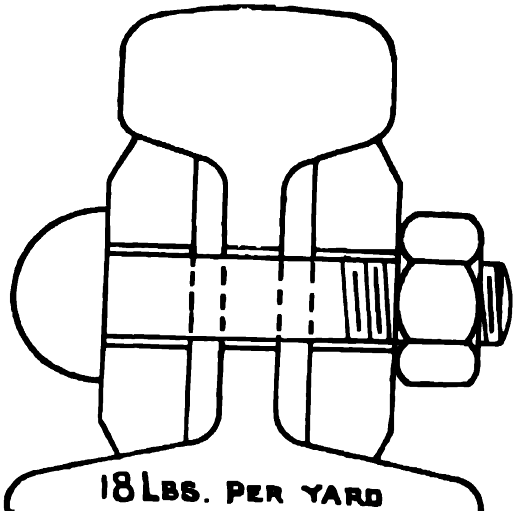
We reserve the right to substitute similar sections of Rails and Sleepers to those shown so long as the carrying capacity remains unaltered and the durability is not affected.

Rails and Sleepers.

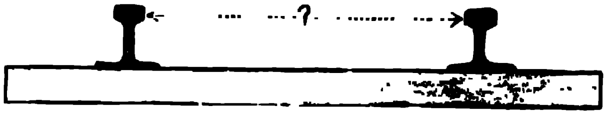

14 LBS. PER YARD

We carry large stocks of Light Rails 14 and 18 lbs. per yard, with fittings and accessories as illustrated on this and the following pages.

We can also quote for other Light Rail sections up to and including 30 lbs.


18 LBS. PER YARD

Our stock gauge is 2 ft., but 2 ft. 6 ins. and metre gauge tracks can be supplied.



The gauge is always measured from inside to inside of head of rail

For Portable Railways we strongly recommend Steel Trough Sleepers either plain or corrugated, as illustrated. They can be laid by coolie labour, and it is impossible to put them out of gauge.

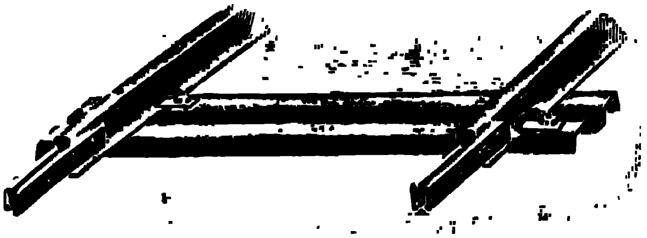
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

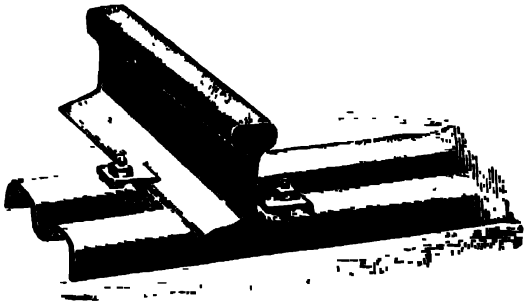
JESSOP & Co. LTD
ENGINEERS

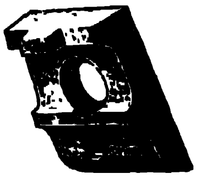
RANGOON, MADRAS,
BOMBAY, LONDON.

Light Railway Equipment.

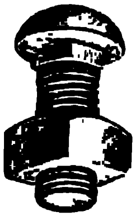
Portable Track.







Rolled Steel Clip.



Snap Head Sleeper Bolt.

The illustrations show the standard method of fastening Light Portable Railway Track by means of Rolled Steel Clips and Clip Bolts and Nuts

Dog Spikes.

Dog Spikes for all sections of rails can be supplied from stock, or made in our works, at short notice.

Size.	Price.	Size.	Price.
2½ ins. × 3/8 in.	Rs. 28-0 per cwt.	4½ ins. × ½ in.	Rs. 24-0 per cwt.
3 „ × 3/8 „		5 „ × ½ „	
3¼ „ × 3/8 „		5 „ × 5/8 „	
3½ „ × ½ „	„ 24-0 „	5¼ „ × 5/8 „	
4 „ × ½ „		5½ „ × 5/8 „	

Prices for other sizes on application.

Rail Screws.

We have lately executed contracts for the Indian State Railways for the supply of Rail Screws, and shall be pleased to quote for screws other than the Standard Pattern.

Standard Pattern, **Price, Rs. 28-0** per cwt.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Light Railway Equipment.

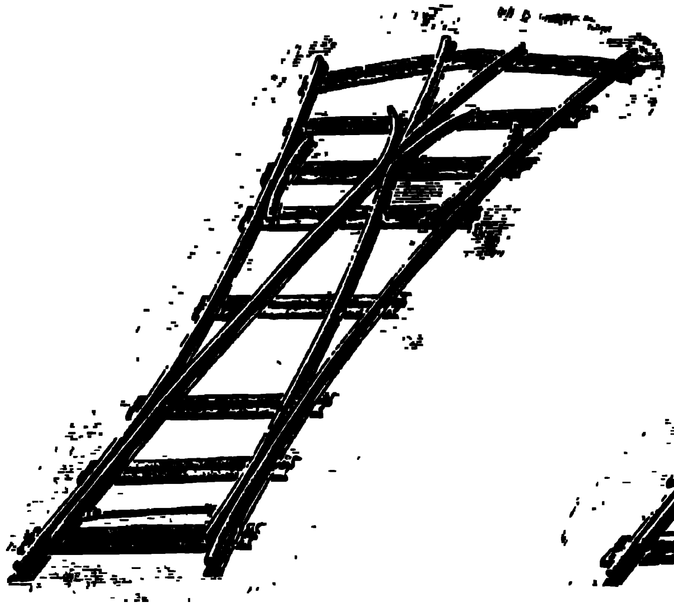
Portable Switches.

The following are the standard lengths of switches suitable for Light Rails up to 2 ft. gauge:—

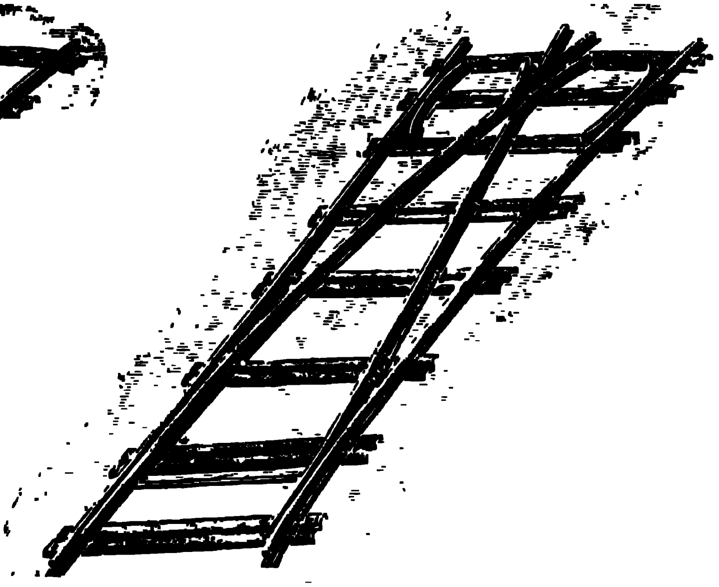
Length 8 ft. 3 ins. Radius about 12 ft. suitable for wagons with a maximum wheelbase of 1 ft. 10 ins.

Length 16 ft. 6 ins Radius about 33 ft. suitable for wagons with a maximum wheelbase of 2 ft. 8 ins.

Length 23 ft. Radius about 83 ft. suitable for wagons with a maximum wheelbase of 4 ft.



Symmetrical Point Switch.

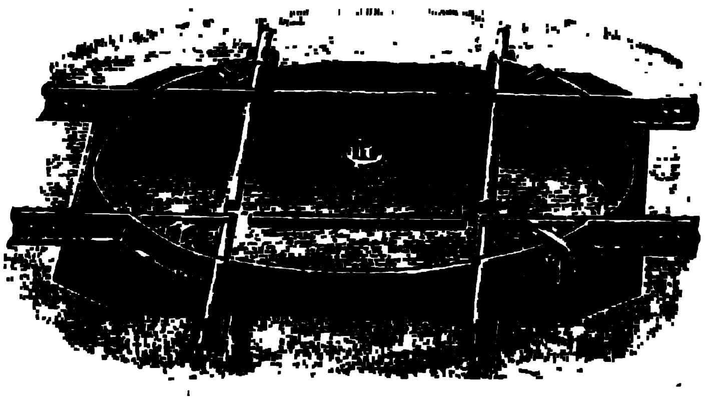


Right Hand Point Switch.

All types of Switches, Points and Crossings with either Steel or Wooden Sleepers can be made up in our Works. We shall be pleased to submit designs to meet the constituent's requirements.

Switch Boxes and Levers can be fitted if required.

Portable Wrought-Iron Turntables.



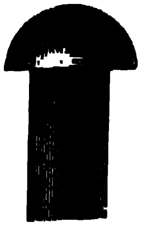
The illustration shows a Portable Self-contained Wrought-Iron Ball Bearing Turntable with double cross track and catch.

We design and construct Turntables for any length and weight of Rolling Stock, and to suit any rail gauge.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Mild Steel Rivet, Snap Head

of Best English Make.

Diameter	In.	¼	⅜	½	⅝	¾ and up
Price, per cwt.	Rs.	30-0	26-0	22-0	19-0	18-0

Nuts, Hexagonal, Tapped

of Best English Make.

		Per lb.		Per cwt.			
Size	Ins.	¼	⅜	½	⅝	¾ to 1½	1¾ to 2
Price, ..	Rs.	0-12	0-9	46-0	36-0	32-0	38-0

Bolts and Nuts, Hex. Heads and Round Necks

of Best English Make.

Diameter	In.	¼	⅜	½	⅝	¾ and up
1 inch long per cwt.	Rs.	90-0	56-0	34-0	26-0	25-0
1¼ ,,						
1½ ,,						
2 ,,						
2½ ,,		82-0	48-0	30-0	24-0	23-0
3 ,,						
3½ ,,						
4 ,,						

Above 4" or intermediate lengths, special rates on application.

Prices of Rivets, Bolts and Nuts quoted above are for quantities of not less than 1 cwt. of one size.

Copper Rivets.

½"×¼"
1"×¼" } Rs. 2-0 per lb.

Galvanized Cup Head Rivets.

½"×¼"
¾"×¼" } Re. 0-9 per lb.

1"×¼"
1"×⅜" } Re. 0-9 per lb.

Whitworth's Standard Sizes of Bolts and Nuts.

Diameter of Bolt in inches.		No. of Threads per inch.	Diameter at bottom of Thread in inches.	Distance over Flats in inches.	Distance over Corners in inches.	Thickness of Bolt Head in inches.	Sectional area at bottom of Thread in square inches.
Fractional Sizes.	Decimal Sizes.						
¼	·25	20	·186	·525	·606	·219	·027
⅜	·375	16	·295	·709	·819	·328	·068
½	·5	12	·393	·919	1·061	·437	·121
⅝	·625	11	·508	1·101	1·271	·547	·203
¾	·75	10	·622	1·301	1·502	·656	·304
⅞	·875	9	·733	1·479	1·707	·766	·422
1	1·0	8	·840	1·670	1·928	·875	·554
1⅛	1·125	7	·942	1·860	2·148	·984	·697
1¼	1·25	7	1·067	2·048	2·365	1·094	·894
1⅜	1·375	6	1·161	2·215	2·557	1·203	1·060
1½	1·5	6	1·286	2·413	2·787	1·312	1·300

Whitworth's Standard Bolts and Nuts.

Hexagonal Head and Nut.

Calculated Weights in Pounds.

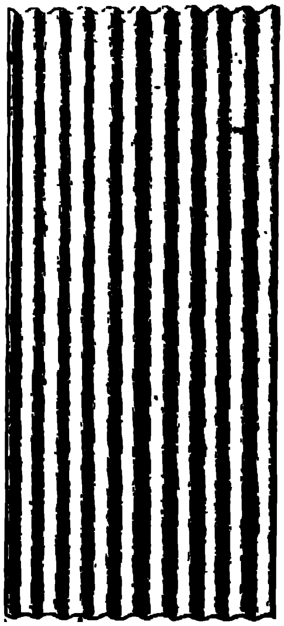
Length of Bolt in inches.	Diameter of Bolt in inches.										
	¼	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½
1	·042	·106	·222	·376	·612	..	..	..	..	..	..
1⅛	·044	110	·229	·387	·628	.	..	..	.	..	.
1¼	·045	·114	·236	·398	·643	·944	..	..	..	..	..
1⅜	047	·118	243	·408	·659	·965	..	..	..	..	..
1½	·049	122	·250	·419	675	·986	1·394	..	..	..	.
1⅝	050	126	257	·430	·690	1·008	1·421	.	..	..	..
1¾	052	130	·264	·441	706	1·029	1·449	1·966	..	.	..
1⅞	054	·134	·271	452	·722	1·050	1 477	2·001	.	.	.
2	056	138	·278	·463	737	1 072	1·505	2·036	2·671	.	..
2¼	·059	·145	292	484	·769	1 114	1·561	2·107	2·758	..	..
2½	·063	153	·305	·506	800	1·157	1·616	2·177	2·845	3 572	..
2¾	·065	161	·319	·528	·831	1·199	1·672	2·247	2·932	3·678	..
3	069	·169	·333	·549	862	1·242	1·727	2·318	3·019	3·783	4·766
3¼	·071	177	·347	·571	·894	1·284	1·783	2·388	3·106	3·888	4·891
3½	·075	185	·361	·593	925	1 372	1·838	2 459	3·193	3·993	5·016
3¾	·079	192	·375	615	·956	1·369	1 893	2·529	3·280	4·098	5·142
4	·082	·200	389	·637	·988	1·412	1·950	2 600	3·367	4·204	5·267
4¼	085	·208	·403	·658	1.019	1·455	2 005	2·670	3·454	4·309	5·392
4½	·089	216	·417	·680	1.050	1·497	2·061	2·740	3·541	4·414	5·517
4¾	·092	·224	·431	702	1.081	1·540	2·116	2·810	3·627	4·519	5·642
5	·096	·232	·445	·724	1.113	1·583	2·172	2·881	3·714	4·624	5·767
5¼	·099	·240	·459	745	1 144	1·625	2·228	2·952	3·801	4·730	5·893
5½	103	247	472	·767	1·175	1 667	2 283	3·022	3·888	4·835	6·018
5¾	·106	·255	·486	·789	1·207	1·710	2·339	3·092	3·975	4·940	6·143
6	110	·263	500	·810	1 238	1·753	2·394	3 163	4·062	5·045	6·268
6½	117	·279	·528	854	1·300	1·838	2·506	3 303	4·236	5·256	6·518
7	·124	294	·556	·897	1·363	1·923	2 617	3·444	4·410	5·466	6·769
7½	·130	·310	·584	941	1 425	2·008	2·728	3·585	4·584	5·676	7·019
8	·138	·326	·612	·984	1·488	2·094	2·839	3·726	4·757	5 887	7·270
8½	.	341	·639	1·028	1·550	2·179	2·950	3·867	4·931	6·097	7·520
9	..	·357	667	1·071	1·613	2·264	3·062	4·008	5·105	6·308	7·770
9½	..		·695	1·115	1·676	2·349	3·173	4·149	5·279	6·518	8·021
10	..	..	·723	1·158	1 730	2 434	3·284	4·290	5·453	6·728	8·271
10½	..	..	.	1·202	1·801	2·519	3·396	4·430	5·627	6·939	8·521
11	..	.	..	1·245	1·863	2·605	3·507	4·571	5·800	7·149	8·772
11½	..	..	.	..	1·926	2·689	3·618	4·712	5·974	7·360	9·022
12	..	..	.	..	1·989	2·775	3·729	4·853	6·148	7·570	9·272
Weight in lbs. of one Nut	·0134	·0345	·0757	·1394	·2164	·3203	·4611	·6379	·8511	1·075	1·391
Weight in lbs. of Shank per 1 inch of length	·0139	·0313	·0557	·0869	·1252	·1703	·2225	·2817	·3477	·4208	·5007
Weight in lbs. of Shank per 1 foot of length	·167	·376	·668	1·043	1·502	2·044	2·670	3·380	4·172	5·049	6·008

Galvanized Corrugated Sheets.

By First Class British Makers.

We carry large stocks of Galvanized Corrugated Sheets in sizes from 6 ft. to 10 ft. long by 2 ft. 8 ins. wide, that is 10 corrugations of 3 ins. wide, in the following gauges:- -18, 20, 22 and 24 B.G.

We shall be pleased to quote for any other Standard Gauges.



Gauge.	Corrugations.	Length.	Width Overall.	Approximate number of sheets per ton.	Approx. weight per 100 sq. ft. of roofing including 2 corr. side and 6 ins. end laps.	Price per cwt. Rs. As.
18 B.G.	10/3 ins.	6 feet	2ft. 8 ins.	62	290 lbs.	18-8
,, ,,	,,	7 ,,	,,	53		
,, ,,	,,	8 ,,	,,	46		
,, ,,	,,	9 ,,	,,	41		
,, ,,	,,	10 ,,	,,	37		
20 ,,	,,	6 ,,	,,	79	240 lbs.	
,, ,,	,,	7 ,,	,,	68		
,, ,,	,,	8 ,,	,,	59		
,, ,,	,,	9 ,,	,,	53		
,, ,,	,,	10 ,,	,,	47		
22 ,,	,,	6 ,,	,,	97	195 lbs.	
,, ,,	,,	7 ,,	,,	83		
,, ,,	,,	8 ,,	,,	73		
,, ,,	,,	9 ,,	,,	65		
,, ,,	,,	10 ,,	,,	58		
24 ,,	,,	6 ,,	,,	117	160 lbs.	18-0
,, ,,	,,	7 ,,	,,	100		
,, ,,	,,	8 ,,	,,	88		
,, ,,	,,	9 ,,	,,	78		
,, ,,	,,	10 ,,	,,	70		

Sheets are made up in bundles weighing approximately 2 cwts., details of number of sheets per bundle are as follows:—

Gauge.	Number of Sheets per Bundle.				
	Length 6'-0"	Length 7'-0"	Length 8'-0"	Length 9'-0"	Length 10'-0"
18 B.G.	6	5	5	4	4
20 ,,	8	7	6	5	5
22 ,,	10	8	7	6	6
24 ,,	12	10	9	8	7

Galvanized Plain Sheets.

Prices per cwt.

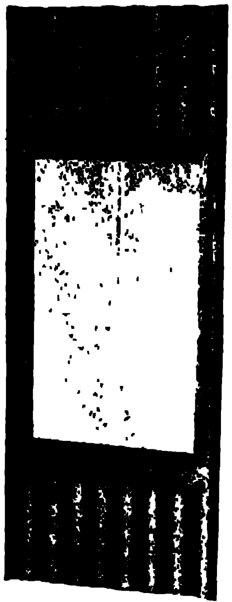
SIZE.	THICKNESS.					
Length and Breadth	24 B.G.	22 B.G.	20 B.G.	18 B.G.	16 B.G.	⅛"
6'-0"×3'-0" 8'-0"×3'-0" 8'-0"×4'-0" 10'-0"×4'-0"	**Rs. 24-0**	**Rs. 24-0**	**Rs. 23-0**	**Rs. 23-0**	**Rs. 23-0**	**Rs. 22-0**
Weight per square foot .. lbs.	1·11	1·37	1·70	2·14	2·67	5·35

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Galvanized Roof Fittings and Fixings.



Dead.

Galvanized Corrugated Skylights.

Manufactured by first class British makers from best quality Black Mild Steel Sheets, and specially galvanized after.

Suitable for Side or Roof lights.

Fixed in the same way as Corrugated Sheets.

Made of 24 B.W.G. Galvanized Steel 2' 8" wide.
To fit sheets 10'-3" Corrugations.

Daylight.	In Sheets.	6 ft. long.	7 ft. long.	8 ft. long.	9 ft. long.
36" by 20"	Dead Rs.	22-0	24-0	26-0	28-0
36" by 18"	Opening Rs.	32-0	34-0	36-0	38-0

Opening.

Galvanized Ridge Capping and Guttering.

Galvanized Roll Top Ridging.

Prices are per length of six feet.

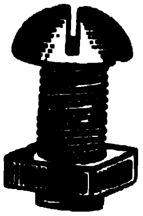
Size	20G	22G.	24G.
	Rs.	Rs.	Rs.
6"×18	4-8	3-14	3-8
9"×24	5-8	5-0	4-4
12"×30	6-12	6-0	5-4

Galvanized Half-Round Guttering.

Prices are per length of six feet.

Size	20G.	22G.	24G.
	Rs.	Rs.	Rs.
6" wide	4-4	3-0	3-4
9" „	5-4	4-12	4-0
12" „	6-8	5-12	5-0

Galvanized Slot Head Bolts and Nuts.

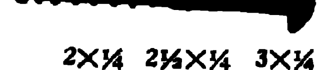


Size Ins.	¾ & 1 by ¼	1¼ & 1½ by	1¼ 1½ & 1¾ by
Price per gross, Rs.	3-12	4-4	8-0

Galvanized Hook Bolts and Nuts.

Size Ins.	⅜×3	⅜×3½	⅜×4	⅜×4½	⅜×5	⅜×6
Price, Rs.	65-0 per cwt.					

Galvanized Cone Head Screws.



Size Ins.	2×¼	2½×¼	3×¼	2½×⅜
Price Rs.	0-12 per lb.			

Washers.

Plain Heavy Iron	..	..	**Rs. 35-0**
Galvanized Limpet	**⅜" No. 1**	**per gross**	**„ 3-0**
„	**¼" „ 2**	**„ „**	**„ 2-8**
„ **Iron**	**¼" & ⅜"**	**per cwt.**	**„ 48-0**
„ **Diamond**	**¼" & ⅜"**	**„**	**„ 56-0**
Lead	**¼" & ⅜"**	**„**	**„ 65-0**

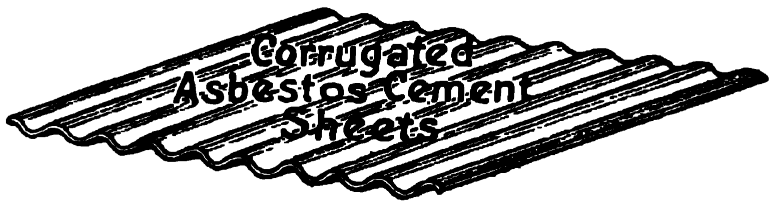
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Asbestos Cement Corrugated Sheets.

Asbestos Cement Corrugated Sheets are made of first class Portland Cement and Asbestos Fibre and are adapted for covering, with economy of labour and framing, the roofs and external walls of large engineering and factory buildings, railway running sheds, breweries and the like and they can be readily fixed to steel angles as on to timber purlins. They are very durable and are specially suited for tropical countries as they conduct about 70 per cent. less heat than corrugated-iron sheets.



The pre-eminent advantages of these sheets are:—

(1) They do not rust and require no painting.

(2) They are absolutely fire-proof and weather resisting.

(3) Insulate against heat, cold and damp.

(4) Do not expand or contract, crumble or decay.

(5) Proof against vermin and rodents.

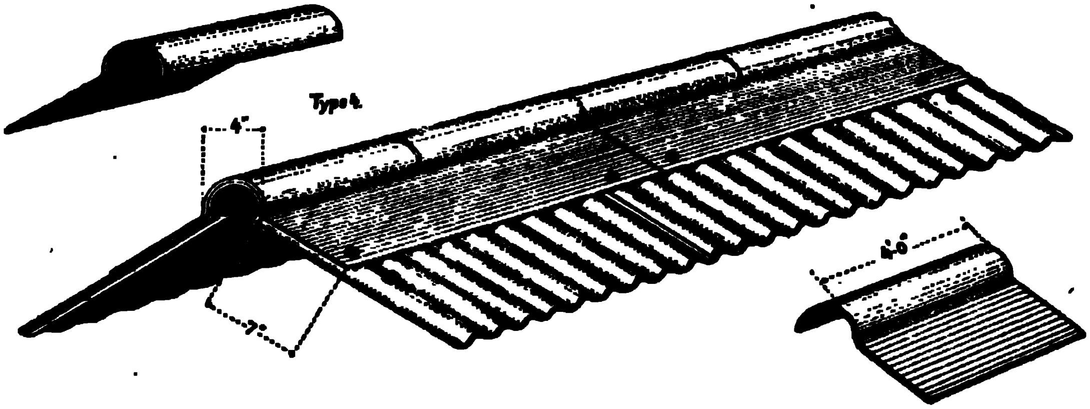
(6) They can be rapidly fixed with ordinary wood working tools by workmen with no special experience.

(7) They are known for their stability and durability.

We can supply in light grey only and in the following lengths:-- 6 ft., 7 ft., 8 ft., 9 ft., and 10 ft. by 30 ins. broad by ¼ in. thick by 3 corrugations.

Price, Rs. 90-0 per hundred sq. feet.

Asbestos Cement Ridging Tiles.



Asbestos Cement Ridging Tiles:—We can supply these for use with the above sheets in lengths of 4 ft. by 7 ins. lap. Each length of ridging is in two parts allowing of adjustment to suit roofs of varying pitch .. .. .. **Price, Rs. 6-0** per length.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Invicta" Brand.

British Portland Cement.

The "Invicta" Brand Portland Cement, imported by us. is manufactured by the British Portland Cement Manufacturers Ltd. at their West Kent Portland Cement Works, Burham and Aylesford. These large factories contain all modern improvements, including the Rotary Lime Kiln Process, for manufacturing the very highest quality of Portland Cement. The Company own property from which the raw materials are obtained and are thus in a position to ensure that the final product is the very best obtainable.

The "Invicta" Brand Cement is guaranteed by the manufacturers to be perfectly free from adulteration and made strictly in accordance with the definition of Portland Cement as laid down by the British Standard Specification.

The Cement has also been analysed and tested in India and the results have been certified as fully conforming to the British Standard Specification (August 1910), and the addendum governing the testing of Cements at the India Store Department. Copies of the test will be sent on application. The "Invicta" Brand Cement is suitable for all kinds of concrete and ferro-concrete work and has been exclusively supplied on some of the largest constructional projects under eminent engineers.

Supplied in Casks 375 lbs. nett, 400 lbs. gross at Rs. 13-0 per cask.

Special rates for large quantities used by Public Works Departments, Railways, Port Trusts, Municipalities and Building Contractors throughout India.

Abstract of British Standard Tests carried out by Messrs. Henry Faija & Co. on a sample taken by them from a bulk of 150-200 tons at the works of the West Kent Portland Cement Co., Ld.

Fineness.

Residue when sifted through a No. 180 by 180 sieve ..	..	..	**13·2** per cent.
British Standard Specification Requirements. August 1910	..	**Max.**	**18·0** ,,
Residue when sifted through a No. 76 by 76 sieve ..	..	..	**0·3** ,,
British Standard Specification Requirements. August 1910	..	**Max.**	**3·0** ,,

Tensile Strength.

7 Days' Test.			28 Days' Test.		
No.	Neat.	Sand.	No.	Neat.	Sand.
1 Broke at	600 lbs.	370 lbs.	7 Broke at	725 lbs.	440 lbs.
2 ,, ,,	620 ,,	320 ,,	8 ,, ,,	770 ,,	430 ,,
3 ,, ,,	660 ,,	390 ,,	9 ,, ,,	820 ,,	410 ,,
4 ,, ,,	650 ,,	330 ,,	10 ,, ,,	760 ,,	415 ,,
5 ,, ,,	660 ,,	350 ,,	11 ,, ,,	810 ,,	420 ,,
6 ,, ,,	670 ,,	380 ,,	12 ,, ,,	855 ,,	400 ,,
Average ..	**643** ,,	**357** ,,	**Average** ..	**790** ,,	**419** ,,
British Standard Requirements	**400** ,,	**150** ,,	**British Standard Requirements**	**5% increase on 675 lbs.**	**7 days' Test 380 lbs.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

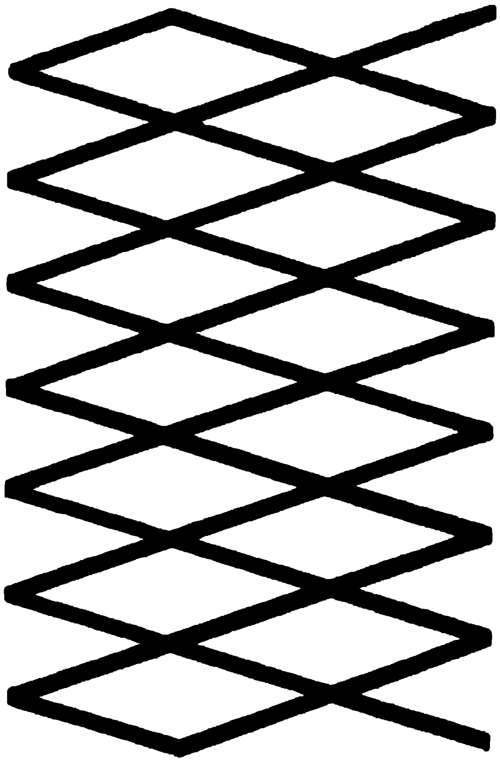
RANGOON, MADRAS,
BOMBAY, LONDON.

Expanded Metal.

This metal is made up from sheets of metal from 24 B.W.G. to ¼ inch thick expanded from two to twelve times its original width.

Expanded Metal as reinforcement for concrete, plaster work, etc., has exceptional qualities, especially in plain and curved areas. It is supplied in flat sheets ready for use; it packs closely, and is easily transported, and quickly handled; it is simple, economical and effective. The expanded sheets are machine made, and although of network formation, there are no loose strands, as the junctions between the meshes remain uncut during the process of manufacture, and thus the strands or members are all rigidly connected and have continuous fibres—important features peculiar to Expanded Metal. The meshes key into each other and consequently interlock where the sheets overlaps at joints, thus the reinforcement may be made absolutely continuous no matter how large the area to be treated.

It is invaluable in all kinds of reinforced work, foundations, walls, floors, roofs, arches, bridges, grain silos, coal pockets, tanks, reservoirs, filter beds, dams, retaining walls, piers, abutments, pipes, sewers, conduits, etc., and is also largely used for open partitions without plaster as in the case of stoves and record rooms, doors, window-guards, etc., where light and air are required as well as the safety of the materials enclosed.



Sheets 8 ft. Long-way of Mesh by 12 ft. Short-way of Mesh.

Sizes of mesh in inches short-way.	Width and Thickness of metal.	Approximate weight in lbs. per super yard.
6	¼" × ¼"	7½
6	⅜" × 3/16"	8½
3	¼" × ¼"	15¼
*3	¼" × ⅛"	7½
3	⅛" × ⅛"	3¾
1½	¼" × ⅛"	15¼
*1½	⅛" × ⅛"	7½
1½	¼" × 16g	7¾
¾	3/16" × ⅛"	19¼
¾	⅛" × ⅛"	13¼
¾	¼" × 16g	11¼
*¾	⅛" × 16g	6½

* We carry stocks of these sizes.

"BB" Expanded Metal Lathing.

This Patent Expanded Metal Lathing is the best of its kind for plaster work and is particularly adapted to form a key for plaster in ceilings, steelwork encasing, solid and hollow partitions, exterior walls, and other plaster work.

Supplied in Sheets 9 ft. by 2 ft. by ⅜ in. Mesh.

					Price.
No. 252.	24 G.	"BB" Lathing approx. weight	3 lbs. per sq. yd.	Rs.	0-5-3 sq. ft.
254.	22 G.		3¾ „ „ „		0-6-3 „

Stanchions and Struts.

Crippling Loads for various values of $\frac{l}{r}$:—A table showing the crippling loads in tons per square inch, on stanchions and struts, for various values of $\frac{l}{r}$ up to 200, is given on page 289.

Tabular Loads:—The safe loads given in the table on page 289 are based on the crippling values referred to, for the least radius of gyration for each section; the factor of safety adopted being 4. They are for stanchions or struts the ends of which may be considered fixed, and only apply to static and concentric loading.

Effective Length:—In stanchions or struts having intermediate steelwork connections, so arranged as to prevent side flexure where these connections occur, the effect is such that the load transmitted may be considered as acting on the shortened length, and the section determined accordingly.

Selection of Stanchions:—It will be observed that, in the stanchion table, the sections are arranged in order of their carrying capacity, thus affording a ready means of selection according to requirements.

Tabular Weight of Stanchions:—The weight given in the table for each section, is for the shaft, inclusive of rivets; the pitch of rivets for lengths, in general demand being taken as the basis for calculation in all cases.

The weights for base, cap and fittings are not included, as they depend on the load, and nature of structure.

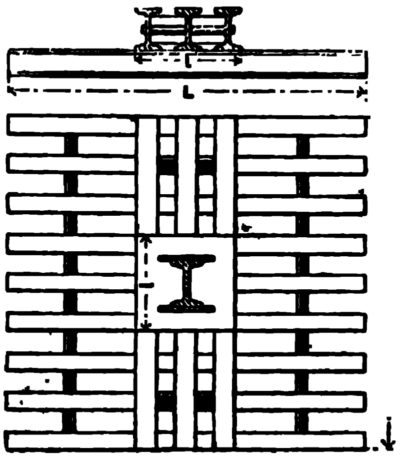
Properties of Sections:—The radii of gyration and area are given for each section, from which the maximum or minimum moment of inertia may be found, by multiplying the square of the corresponding radius of gyration by the area. These values will be of service when calculating additional stresses due to wind-pressure, eccentric loading, or other forces producing bending.

Conditions of Ends: –Under some conditions it is necessary to consider either one or both ends rounded.

In the case of one end fixed, and the other rounded, the allowable load is found by referring in the table to a length of $1\frac{1}{3}$ times the actual length; whilst with both ends rounded the reference length should be $1\frac{2}{3}$ times the actual length.

Example:—For a stanchion or strut 9 feet long with one end fixed and the other rounded, reference should be made in the table of safe loads to a length of 12 feet; or, if both ends are rounded, to a length of 15 feet, when the respective safe loads will be found.

Beam Grillages for Stanchions:—For stanchions carrying heavy loads, the necessity of deep excavations and large masses of masonry in foundations, may be considerably reduced by the adoption of suitable grillages, combined with Stanchion bases, carefully designed to transmit the load.



These are generally obtained by placing on a layer of concrete, one, two, or three tiers of I beams, according to the load to be distributed, and the bearing capacity of the ground. The beams in each tier should be kept sufficiently far apart to allow of the space being thoroughly filled with concrete. Cast-Iron separators, with through bolts, are generally employed to effect this. In cases where two or three tiers are found necessary, they should be efficiently secured to each other, and the stanchion base to the whole.

The diagram illustrates a grillage, consisting of two tiers of beams.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Table of Crippling Loads.

In tons per square inch.

For Stanchions or Struts with fixed ends,* and various values of $\frac{l}{r}$ in which l = length in inches, and r=radius of gyration in inches.

$\frac{l}{r}$	Crippling Load.	$\frac{l}{r}$	Crippling Load.	$\frac{l}{r}$	Crippling Load.	$\frac{l}{r}$	Crippling Load.	$\frac{l}{r}$	Crippling Load.
5	23·97	45	22·45	85	18·92	125	13·99	165	9·93
6	23·96	46	22·39	86	18·81	126	13·87	166	9·85
7	23·95	47	22·33	87	18·70	127	13·75	167	9·77
8	23·94	48	22·26	88	18·59	128	13·63	168	9·69
9	23·92	49	22·19	89	18·48	129	13·51	169	9·61
10	23·90	50	22·12	90	18·37	130	13·40	170	9·53
11	23·88	51	22·05	91	18·26	131	13·29	171	9·45
12	23·86	52	21·98	92	18·15	132	13·18	172	9·37
13	23·84	53	21·91	93	18·03	133	13·07	173	9·29
14	23·82	54	21·83	94	17·91	134	12·96	174	9·21
15	23·80	55	21·75	95	17·79	135	12·85	175	9·13
16	23·77	56	21·67	96	17·67	136	12·74	176	9·05
17	23·74	57	21·59	97	17·55	137	12·63	177	8·98
18	23·71	58	21·51	98	17·43	138	12·52	178	8·91
19	23·68	59	21·43	99	17·31	139	12·41	179	8·84
20	23·65	60	21·35	100	17·19	140	12·30	180	8·77
21	23·62	61	21·26	101	17·06	141	12·19	181	8·70
22	23·59	62	21·17	102	16·93	142	12·09	182	8·63
23	23·56	63	21·08	103	16·80	143	11·99	183	8·56
24	23·52	64	20·99	104	16·67	144	11·89	184	8·49
25	23·48	65	20·90	105	16·53	145	11·79	185	8·42
26	23·44	66	20·81	106	16·40	146	11·69	186	8·35
27	23·40	67	20·72	107	16·27	147	11·59	187	8·28
28	23·36	68	20·63	108	16·14	148	11·49	188	8·21
29	23·32	69	20·54	109	16·01	149	11·39	189	8·14
30	23·28	70	20·44	110	15·88	150	11·29	190	8·07
31	23·23	71	20·34	111	15·75	151	11·19	191	8·00
32	23·18	72	20·24	112	15·62	152	11·09	192	7·93
33	23·13	73	20·14	113	15·49	153	11·00	193	7·87
34	23·08	74	20·04	114	15·36	154	10·91	194	7·81
35	23·03	75	19·94	115	15·23	155	10·82	195	7·75
36	22·98	76	19·84	116	15·10	156	10·73	196	7·69
37	22·93	77	19·74	117	14·97	157	10·64	197	7·63
38	22·87	78	19·64	118	14·84	158	10·55	198	7·57
39	22·81	79	19·54	119	14·71	159	10·46	199	7·51
40	22·75	80	19·44	120	14·59	160	10·37	200	7·45
41	22·69	81	19·34	121	14·47	161	10·28	..	....
42	22·63	82	19·24	122	14·35	162	10·19	..	....
43	22·57	83	19·14	123	14·23	163	10·10	..	....
44	22·51	84	19·03	124	14·11	164	10·01	..	....

*The Crippling Loads for other conditions of ends will be sufficiently accurate if found as follows:—

For one end fixed and the other rounded.—Multiply the actual $\frac{l}{r}$ by 1¼, and the required Crippling Load will be that given in the table for this value.

For both ends rounded.—Multiply the actual $\frac{l}{r}$ by 1¾, and the required Crippling Load will be that given in the table for this value.

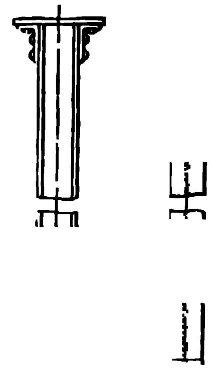
I Beams as Stanchions.

Dimensions and Properties and Safe Loads in Tons for Fixed Ends.

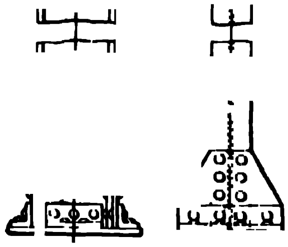
For other conditions of ends see page 287.

Reference Mark		Size Inches	Area Square Inches	Weight per Foot Lbs	Radii of Gyration in Inches About xx	Radii of Gyration in Inches About yy	SAFE LOADS IN TONS FOR Lengths in Feet 6	8	10	12	14	16	18	20	22	[illegible]
IS	1	24×7½	29·10	100	9·50	1·50	164	154	143	130	115	100	87	76	..	.
„	2	20×7½	26·17	89	7·99	1·54	146	138	129	118	105	92	80	70	..	
„	3	10×8	20·60	70	4·09	1·86	118	113	108	101	94	86	78	70	62	
„	4	18×7	22·06	75	7·21	1·46	122	115	106	96	84	73	63	..	..	56
„	5	9×7	17·06	58	3·66	1·64	96	92	86	79	72	64	56	50	..	
„	6	16×6	18·23	62	6·31	1·21	98	89	79	67	57	48	..	..	..	.
„	7	15×6	17·35	59	6·02	1·27	94	86	77	67	57	48	..	..	..	..
„	8	14×6	16·76	57	5·63	1·29	91	84	76	66	56	48	..	..	..	.
„	9	12×6	15·88	54	4·86	1·33	87	80	73	64	55	47	..	..	..	.
„	10	14×6	13·53	46	5·70	1·26	73	67	60	52	44	37	..	..	..	
„	11	12×6	12·94	44	4·93	1·31	70	65	59	51	44	38	..	..	..	
„	12	10×6	12·35	42	4·13	1·36	68	63	57	51	44	38	32	..	..	
„	13	8×6	10·29	35	3·27	1·32	56	52	47	41	35	30	..	..	..	.
„	14	15×5	12·35	42	5·88	·978	62	54	44	36	..	.	..	..	..	
„	15	12×5	11·47	39	4·77	1·03	59	52	43	35	..	..		..	..	
„	16	10×5	10·29	35	4·03	1·07	53	47	40	33	77	..	..	..	..	.
„	17	12×5	9·41	32	4·83	1·01	48	42	35	28	..	..	..	..	..	.
„	18	10×5	8·82	30	4·06	1·05	45	40	34	28	23	..	..	..	..	.
„	19	8×5	8·24	28	3·29	1·11	43	39	33	28	23	..	..	..	..	.
„	20	6×5	7·35	25	2·43	1·11	38	34	30	25	20	..	..	..	..	.
„	21	6×4½	5·88	20	2·42	·959	29	25	21	17	..	..	..	..	..	..
„	22	5×4½	5·29	18	2·07	1·03	27	24	20	16	..	..	..	..	..	.
„	23	9×4	6·176	21	3·62	·824	29	23	18	..	..	..	..	..	..	..
„	24	8×4	5·294	18	3·24	·822	25	20	15	..	..	..	..	[illegible]	..	..
„	25	7×4	4·706	16	2·88	·851	22	18	14	..	..	..	..	..	..	..

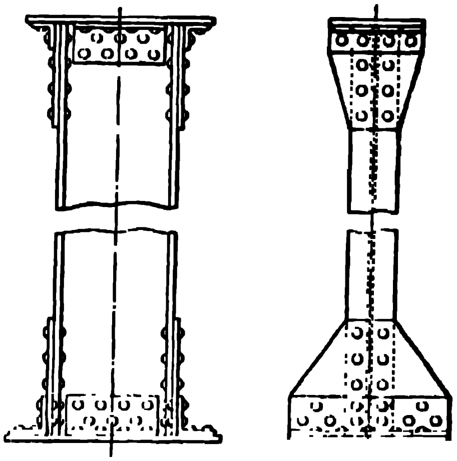
Types of Bases and Caps for Stanchions.



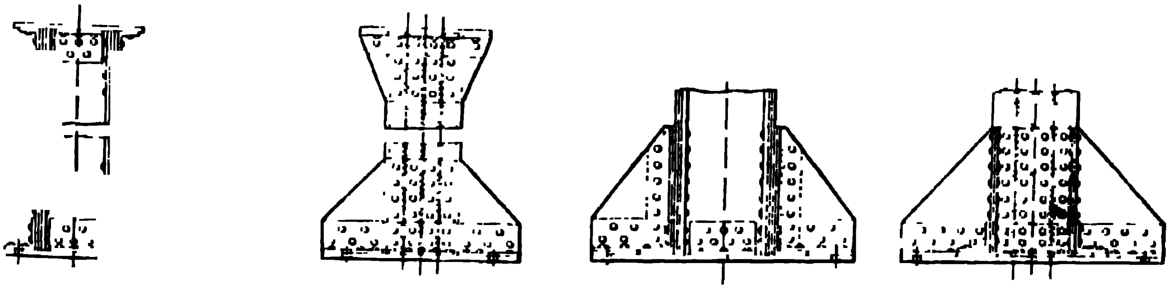
For Small I Beams.



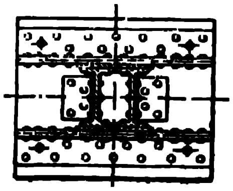
For Medium I Beams.



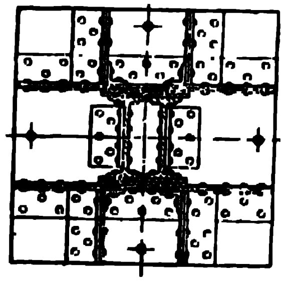
For Large I Beams.



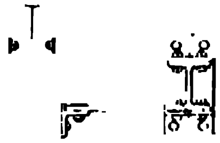
For Double I Beams with Flats. Medium Type.



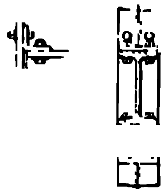
For Double I Beams with Flats. Large Type.



Type Connections of I Beams and I Beam Compounds to Beam Stanchions and Beam Compound Stanchions.



Flange Connections.

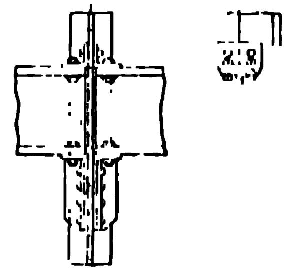


Flange Connections.

Simple Angle Stools and Top Cleats for I Beams.

Flange Connections.

Built Stools and Top Cleats for I Beams.

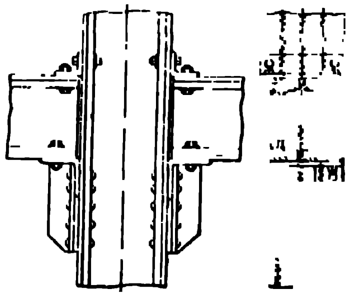


Web Connections.

Built Stools and Top Cleats for I Beams.

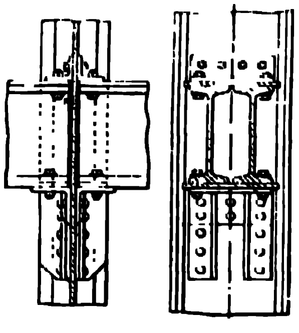
Flange Connections.

Built Stools, Side and Top Cleats for I Beams.

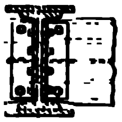


Flange Connections.

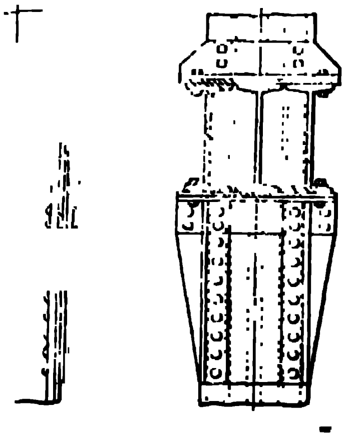
Built Stools and Top Cleats for I Beam Compounds.



Web Connections.



Built Stools and Top Cleats for I Beam Compounds.



Flange Connections.

Gusseted Stools and Top Cleats for I Beam Compounds.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & CO LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Our Howrah Works.

Structural Works.

On the transfer of our old Structural Shops to Jamshedpur in 1918 we completed and brought into operation an entirely new plant in our Howrah Works for the manufacture of Structural Steel.

The new buildings themselves were designed, manufactured and erected by us to accommodate the various machines and processes involved in the most efficient and up-to-date manner. They are of lofty construction, special attention being paid to the question of ventilation and lighting and they are equipped in each of the 50 ft. clear span Bays with several high speed Electric Cranes of 3 and 6-ton capacity. The main Bay is over 600 ft. long and the adjacent Bays are slightly shorter.

The open Erecting Yard on the north of the Structural Works is served by a large 3-ton Semi-Portable Crane working against the main building and running the full length of the yard. This Crane was specially built to give a maximum of head room beneath it and to offer a minimum of obstruction to the steelwork in process of assembly. The north side of this yard is similarly served by another of these Cranes working against the southern face of our Mechanical Works. The equipment of these new Structural Shops is entirely new and is of the most up-to-date type available in the United Kingdom. It has been laid out with the greatest care to insure the most economical and rapid handling of the product from the time it enters as raw material to the completion of fabrication and assembly prior to despatch. All handling of raw material or finished products, whether unloading from or on to Railway Wagons or Carts, is done directly by overhead Electric Cranes.

The accompanying illustrations are indicative of the general lay out of the Works as well as detail of some of the units of the equipment.

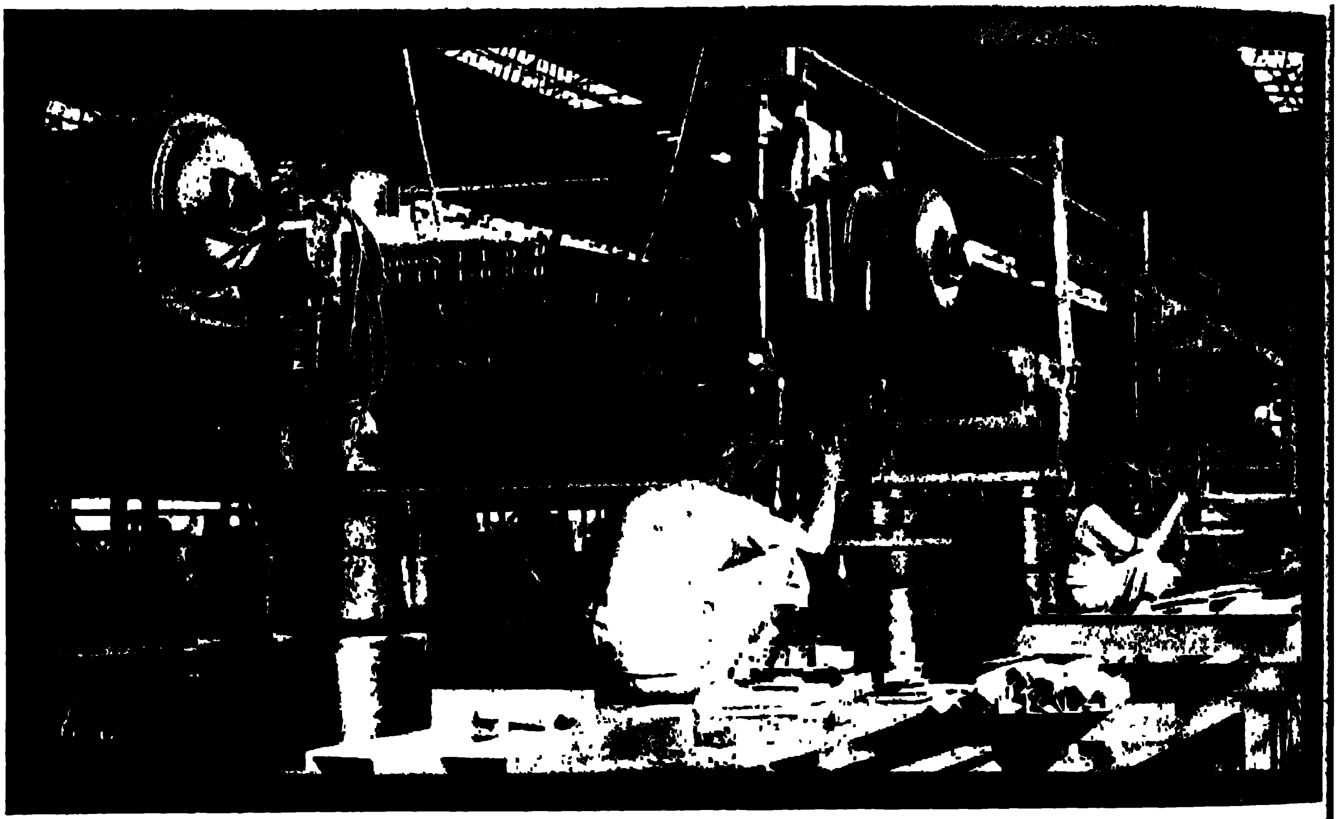
South Bay looking East and showing the 30 ft. Plate Edge Planer on the left, Plate Splitter in the centre, and Straightening Rolls on the right. In the distance is the Battery of High Speed Electric Drills.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS.

RANGOON, MADRAS,
BOMBAY, LONDON.

Our Howrah Works.



Battery of High Speed Radial Drills.

Each Drill in the battery has an independent motor drive and can swing round to handle work on both sides as required.

Plate Straightening Rolls.

These are shown in operation on Web Plates of 40 feet Broad Gauge Plate Girders. The Rolls are of very massive construction and incorporate several patented features in design.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Our Howrah Works.

Hydraulic Pressing Shop.

This section of the Works is equipped with numerous Hydraulic Presses used in the manufacture of Trough Flooring Plates of the heaviest types, Hot Pressing Work, Flanging, etc The Hydraulic pressure is obtained from motor-driven pumps of our own manufacture working in conjunction with accumulators also made in our Mechanical Works.

We are always pleased to conduct prospective purchasers or other interested persons round our Structural and Mechanical Shops at Howrah which are open at all times to our Constituents or their representatives for the inspection of work actually in process.

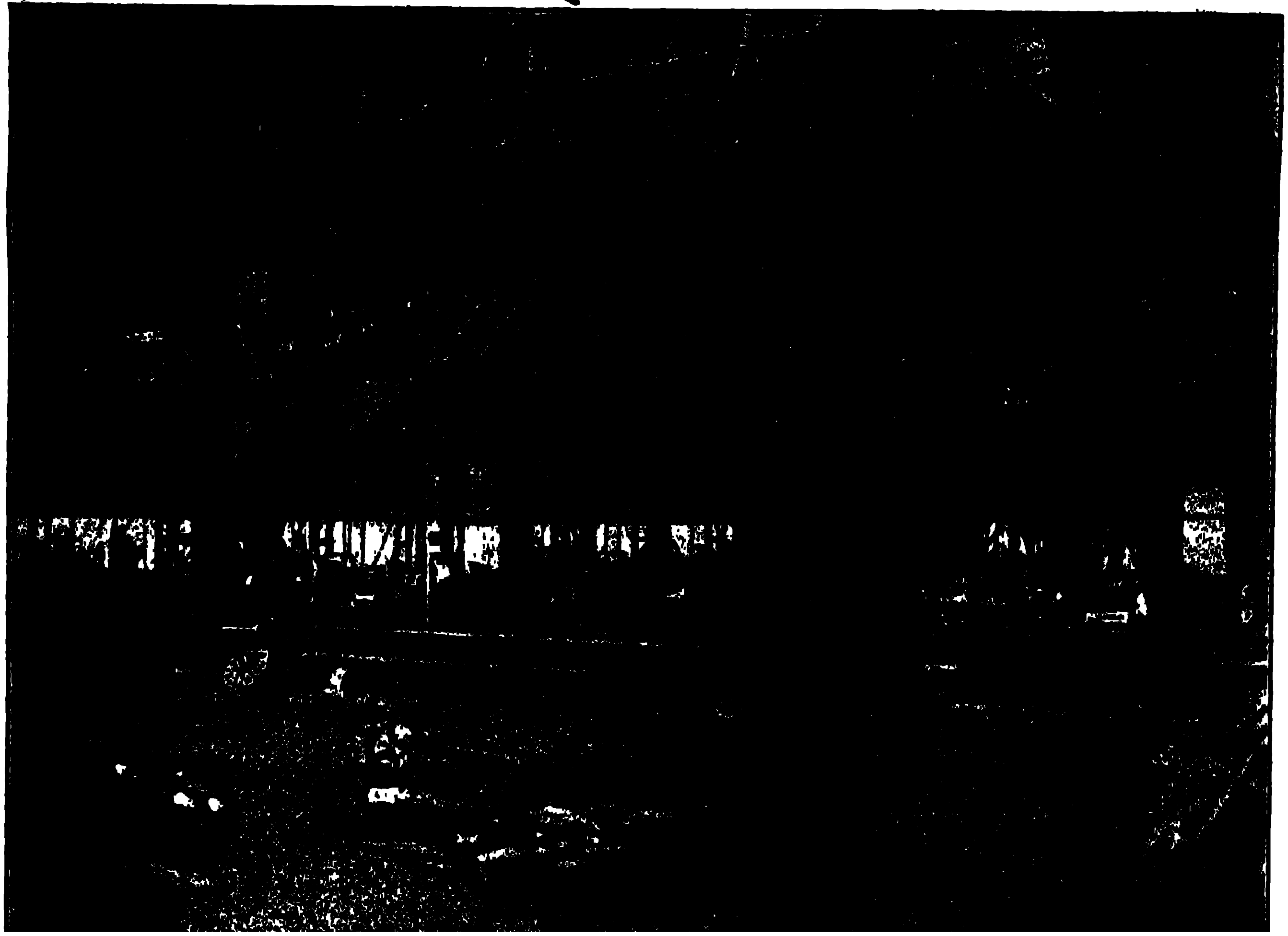
Our Structural Department is always at the disposal of prospective customers for the preparation of designs and estimates for work of any description or magnitude and we confidently assert that the standard of our products in Structural Engineering is **second to none in the East.**

Our Howrah Works.

Mechanical Works.

Our Mechanical Works are situated adjacent to our Structural Works and on the same site at Howrah. In it are grouped our Machine Shops, Fitting Shops, Engine Shops and Millwright Shops, an extra large Forge and Smithy, a Brass and Iron Foundry and attendant Pattern Shop.

These Shops are replete with most up-to-date machines for the manufacture of any class of mechanical work in Steel, Iron or other metals and wood.



Machine Shop.

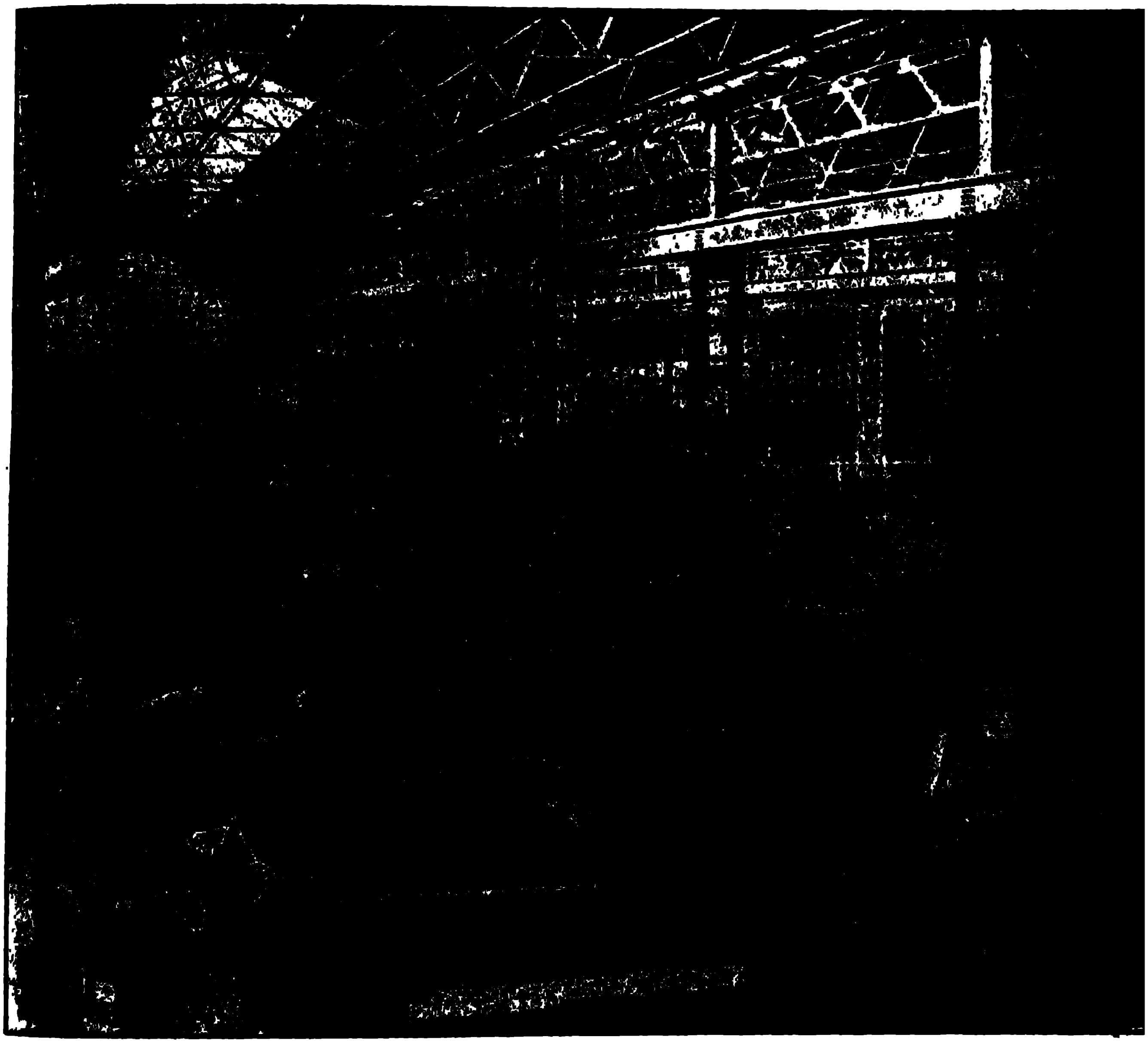
View showing part of our Howrah Machine Shop containing over 200 Machine tools electrically driven throughout. All the shops are traversed by Electric Cranes, and a siding from the East Indian Railway crossing each Bay facilitates the rapid handling and despatch of goods, work being transferred direct by crane from the Packing Department to the railway wagons. Deliveries by river are made from our own jetty served by Electric Cranes.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY,

Our Howrah Works.



The above view shows one Bay of our New Shops at Howrah and a part of our extensive Foundry.

Our Garden Reach Works.

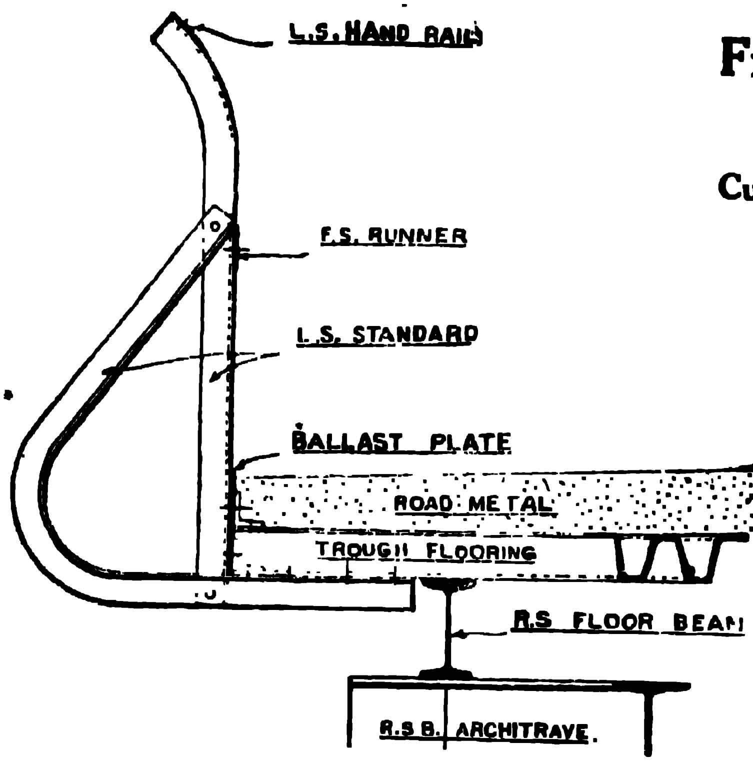
We may mention *en passant*, our Garden Reach Wagon Works, built and equipped for the manufacture and erection of all types of Railway Trucks, Wagons and Rolling Stock.

We have erected hundreds of wagons for the various railways in India as well as Bogie Underframes up to 67 feet long for passenger stock.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

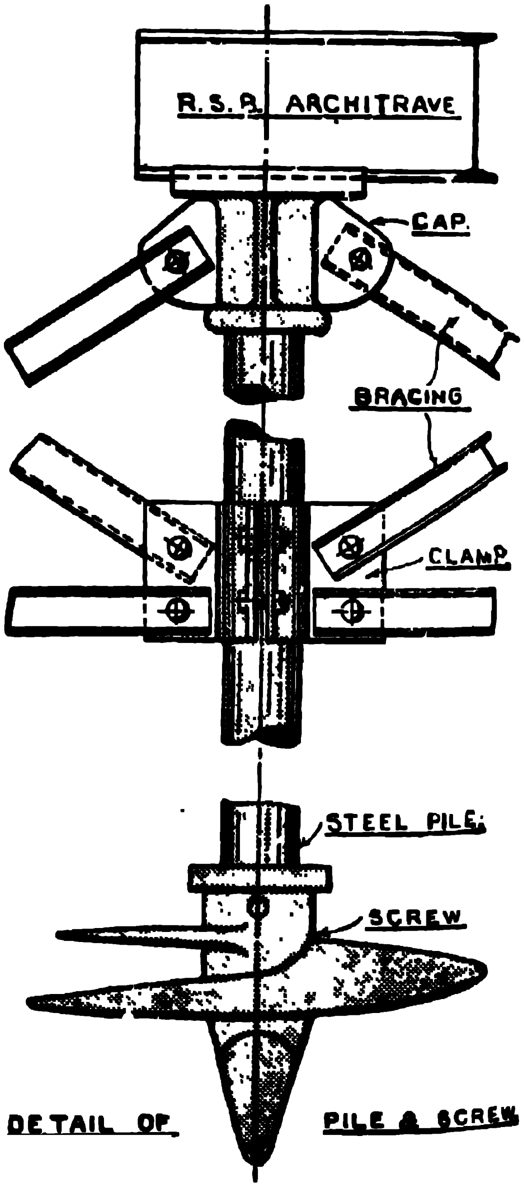
RANGOON, MADRAS,
BOMBAY, LONDON.



Finished Bridge and Jetty Steelwork.

Cut to dead lengths and straightened where necessary.

Fitted and drilled ready for erection.



Owing to considerable variations in design for different widths of roads and spans, it is impossible to quote firm prices, but we shall be pleased to quote special rates for definite enquiries.

Rolled Steel Girders. Architraves and Floor Beams.

Cast-iron Pile Caps and Screws.

Mild Steel Piles in stock lengths up to 40 ft. 3", 4", 5" and 6" dia. with flats Machine Drilled and fitted to caps and screws.

Channel or Angle Bracings.

Forged Pile Clamps.

Trough Flooring Plates.

Bolts and Nuts.

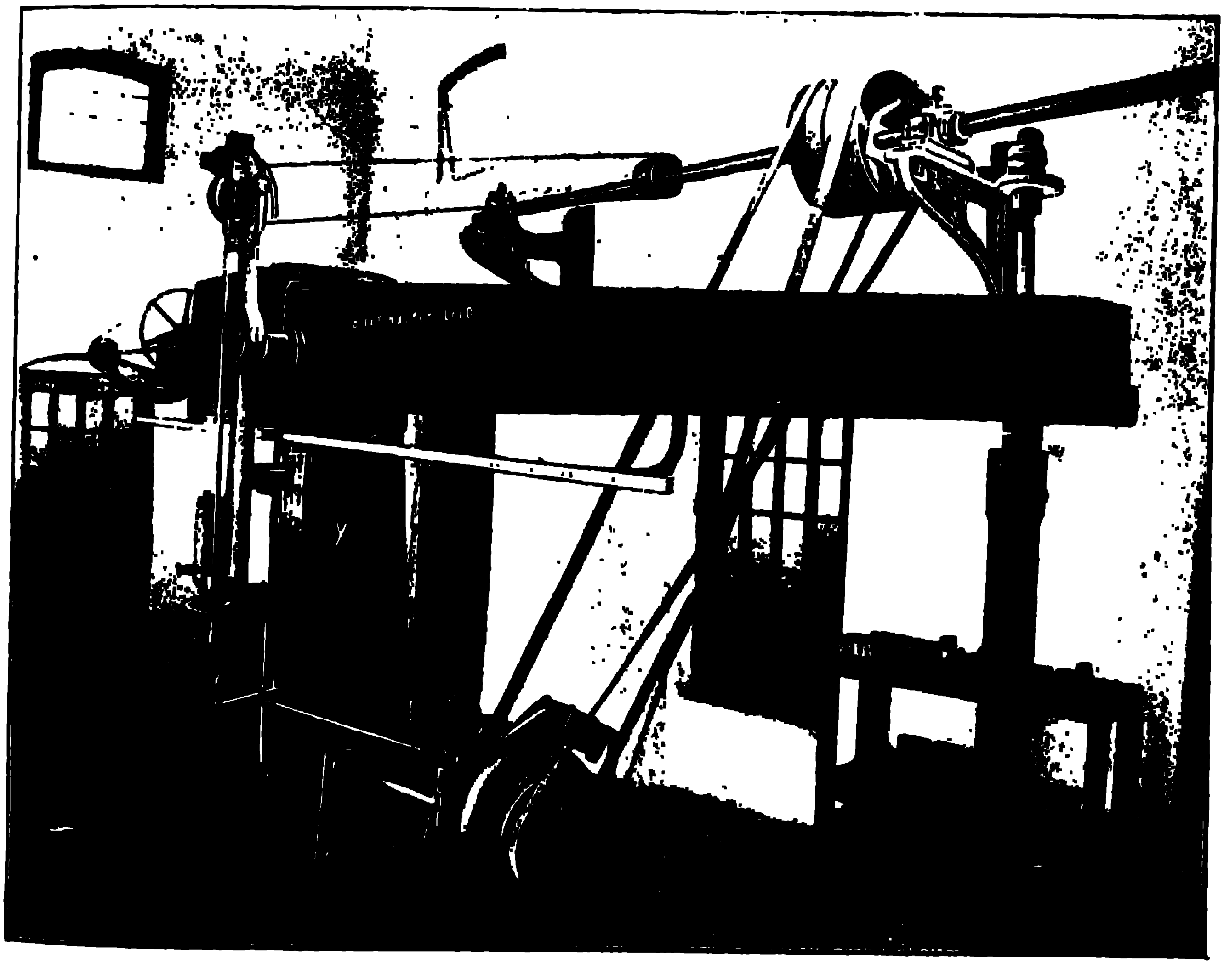
Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

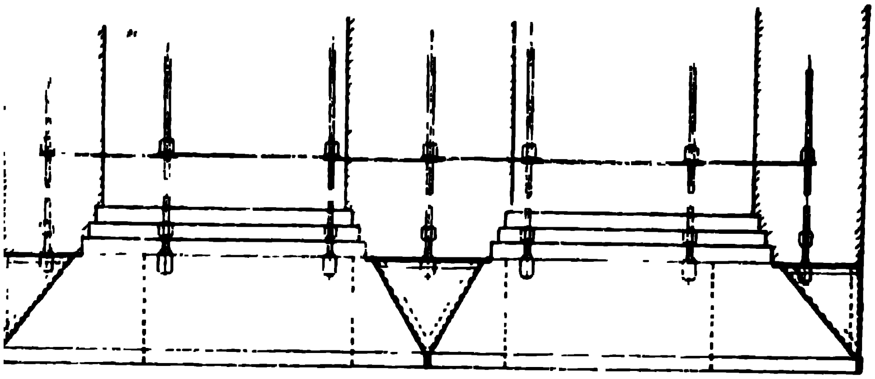
RANGOON, MADRAS,
BOMBAY, LONDON.

50-Ton Electrically Driven "Buckton" Testing Machine.

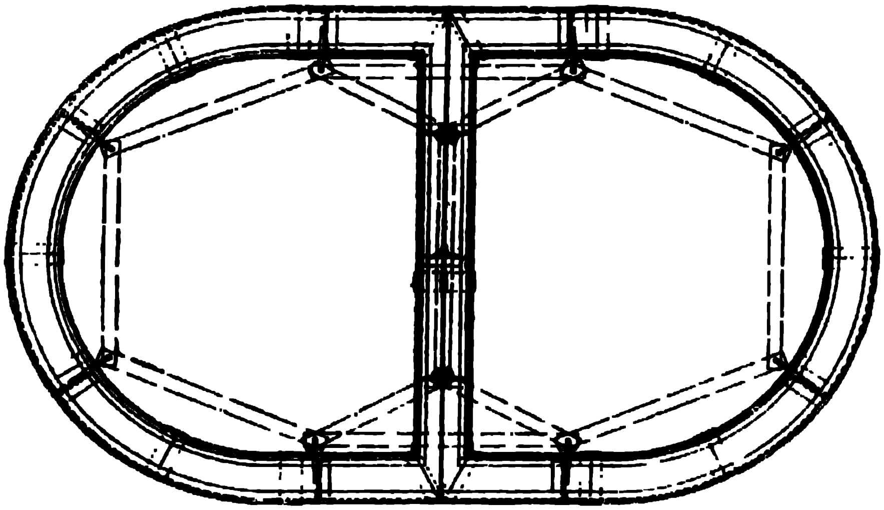


This illustration shows a 50-Ton Electrically Driven " Buckton " Testing Machine of the latest design in our Howrah Works, where we make all the necessary tests of material required by our constituents.

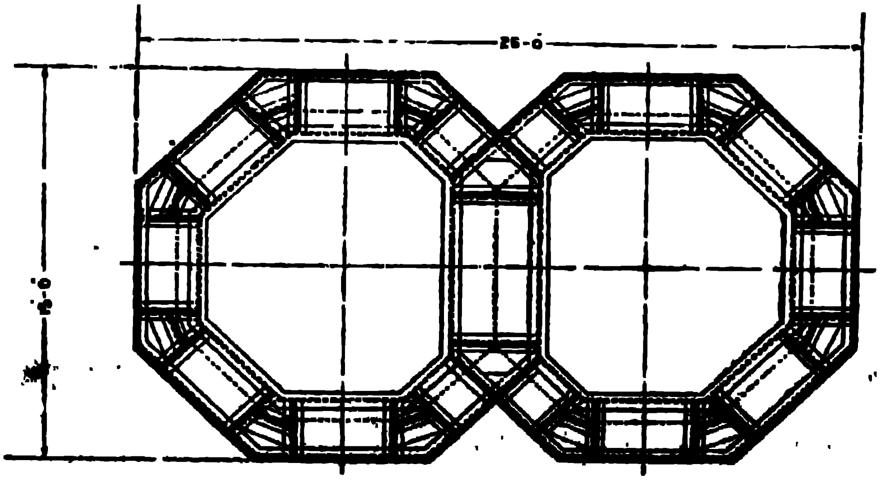
Well Curbs.



Sectional elevation of Double Octagonal or Oval Well Curb.

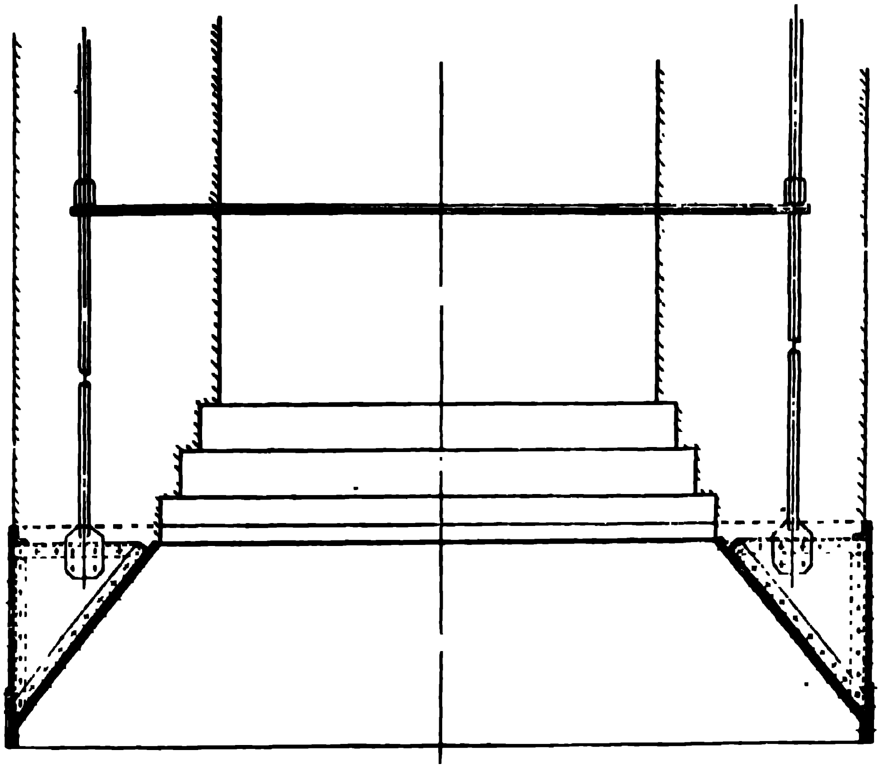


Plan of Oval Well Curb, of which we recently made twenty-five in sizes varying from 20 feet by 12 feet to 35 by 21 feet, for bridges on the Sara-Serajgunge Railway.

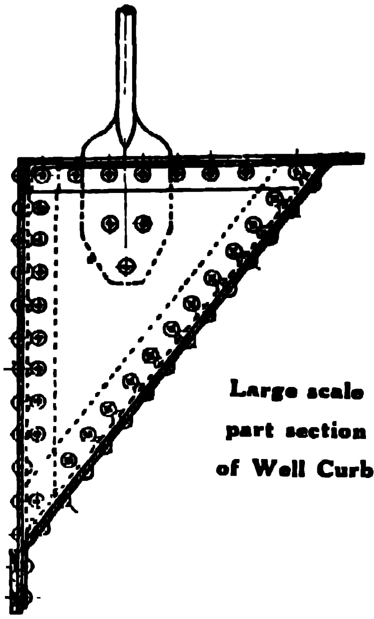


Plan of Octagonal Well Curb.

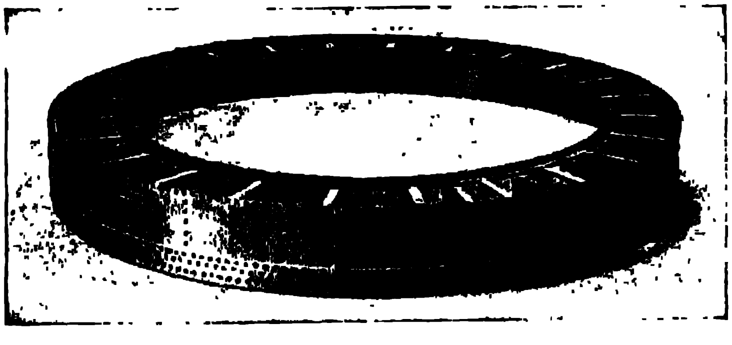
Well Curbs.



Sectional Elevation of Circular Well Curb.



Large scale part section of Well Curb.



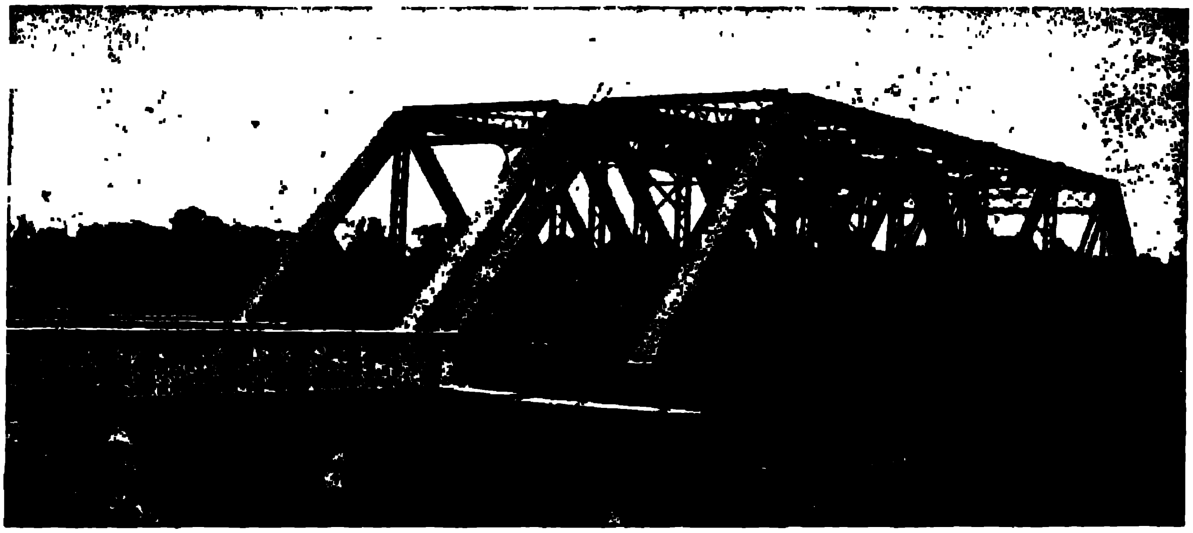
The piers of most large Indian Bridges are built by sinking wells in the soft strata usually found in Indian riverbeds. A hollow framework of steel or wood with steel - cutting edge is laid on the ground and sunk by excavations made from the interior assisted by the weight of the framework and the brickwork which is built thereon as the framework or well curb sinks. We illustrate on this and the opposite page a few of the shapes usually adopted for these well curbs. The cone plates are bent by hydraulic pressure, the damage to the fibre of the steel caused by hammering being thus obviated. The curbs are completely fitted up in our shops and dismantled in as few and as large sections as can be conveniently handled at site and in transit, leaving only a few rivets to be put in at site, the remainder being closed by hydraulic or pneumatic pressure. We have drawings, jigs and templates for a number of standard sizes and in normal times a very large stock of plates enabling us to give quick delivery.

CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW,

JESSOP & Co. Ltd.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Bridges.

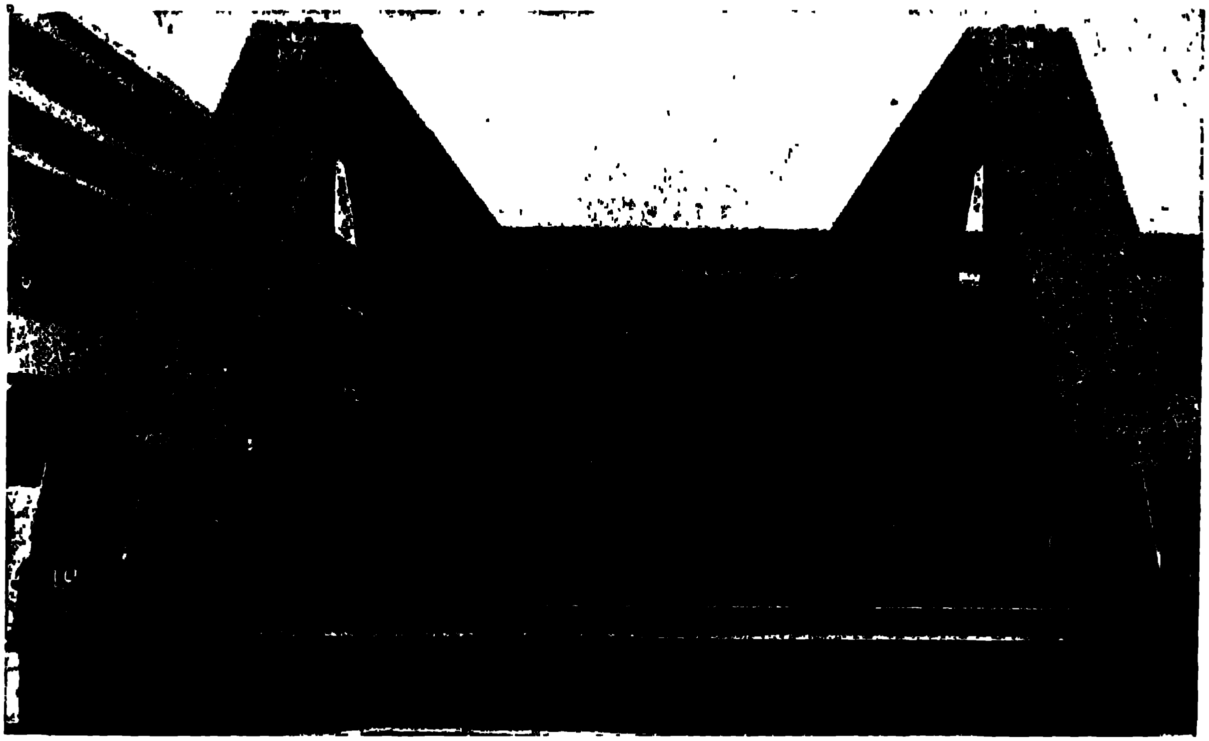


Main line bridge over Tolly's Nullah for E. B. Railway.

Another view of the same bridge.

A main line bridge designed, manufactured, and erected by us. The spans measure 118 feet 4 inches between centres of bearings. The whole structure is designed for standard loading for 5 feet 6 inches gauge.

Railway Bridges.



Girder Bridge for the E. B. Railway. (100′ Span).

Another view of the above Span.

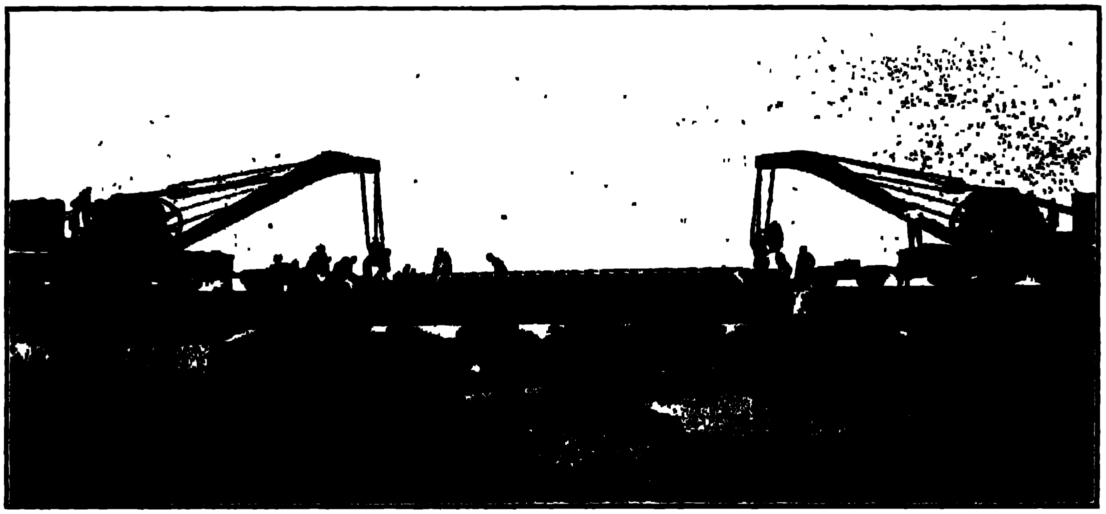
A further example of Railway Bridge construction. Two illustrations of a 100-foot span main line broad gauge bridge temporarily erected in our shops ready for final inspection.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

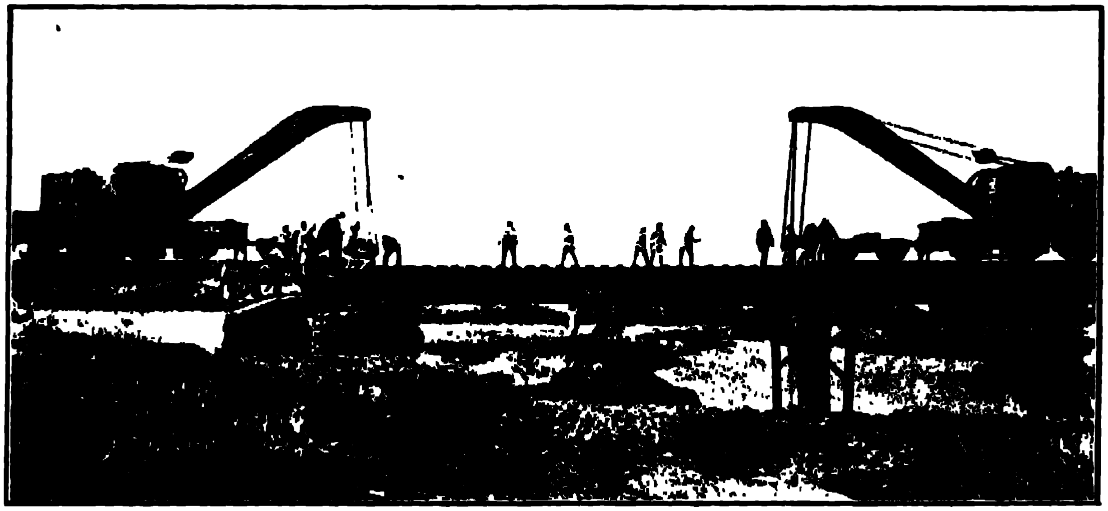
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Bridges.



Lowering new Girder on the far side of the Trestle.



New Girder in its final position, old one being raised up.

The illustrations show Railway Girders of 40 feet span supplied by us to replace existing girders of an older type for the Eastern Bengal Railway.

The method adopted by the Eastern Bengal Railway, for renewing the girders is shown by the photographs, and proved to be both expeditious and cheap.

On each side of the girder to be renewed temporary trestling, wide enough to house a girder, was built up. The new girder was then run out on bogies to the bridge.

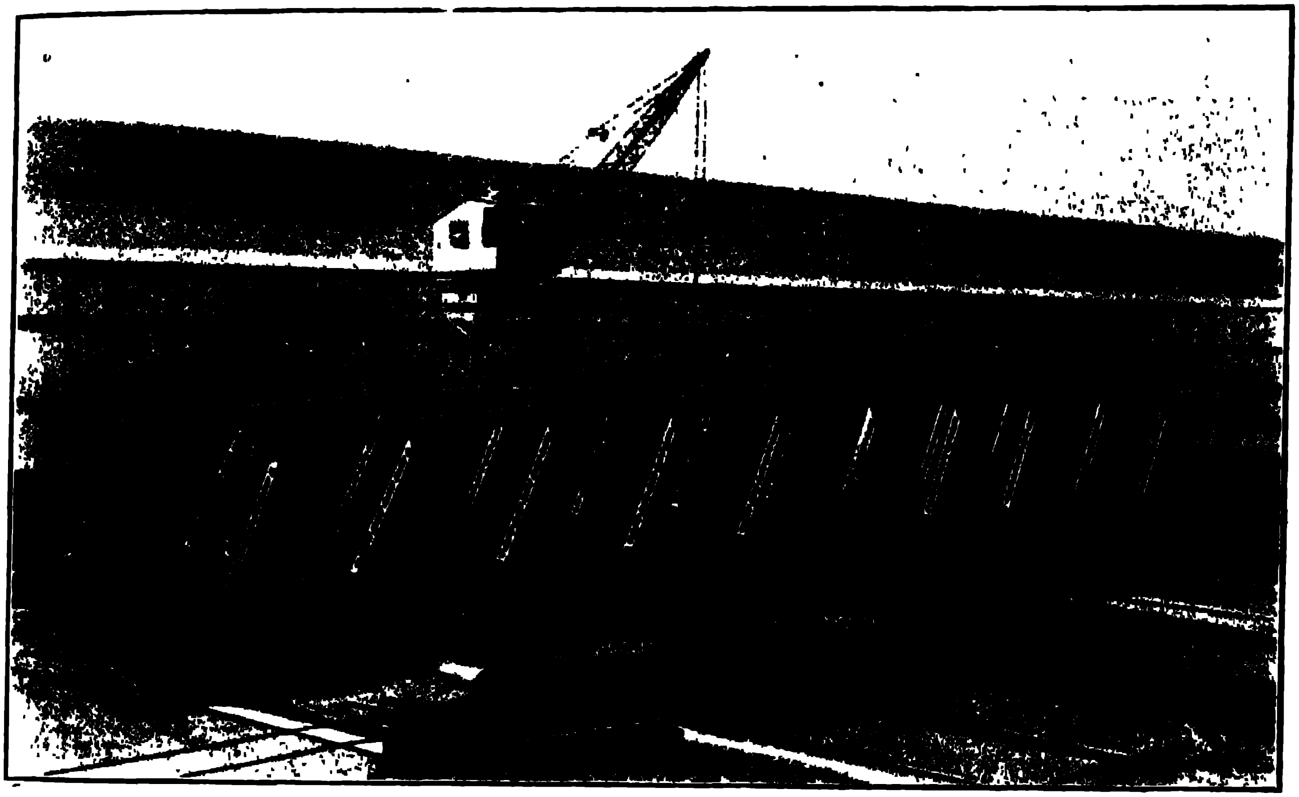
The total time taken over these operations, including the time taken by the Crane Special in bringing the new girder from and taking the old girder back to a station 2¼ miles away, was 1 hour 23 minutes. The actual change took 49 minutes.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

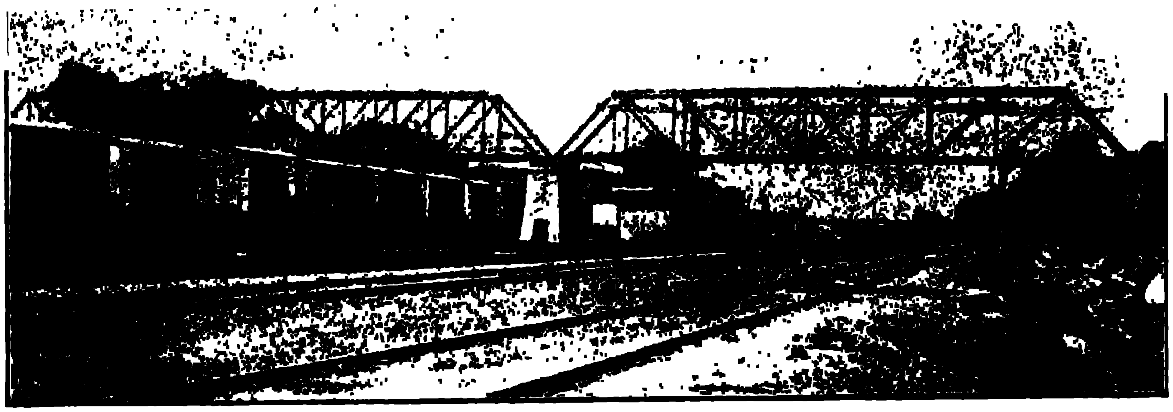
Railway Bridges.



Lattice Girder Bridge for the N.-W. Railway. (150″ Span).

The above illustration shows a Screw Pile Railway Bridge, which we built for the Calcutta Port Commissioners, consisting of 7 spans of 40 feet Plate Girders, across the Boat Canal.

Railway Foot Overbridges.



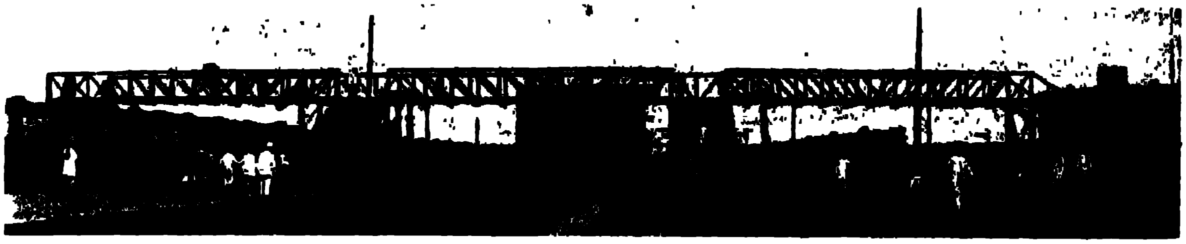
The overbridge in the top illustration was supplied and erected by us at Lucknow for the Oudh and Rohilkhund Railway. It is 10 feet wide and consists of two spans, one 137 feet, and the other 113 feet clear of pillars, with an approach 126 feet 6 inches long. It is situated at the East End of the Station Yard. The lower illustration shows the overbridge made and erected by us at Ranaghat Station, Eastern Bengal Railway. It is 46 feet 6 inches span and 12 feet wide and is of the self-supporting type.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

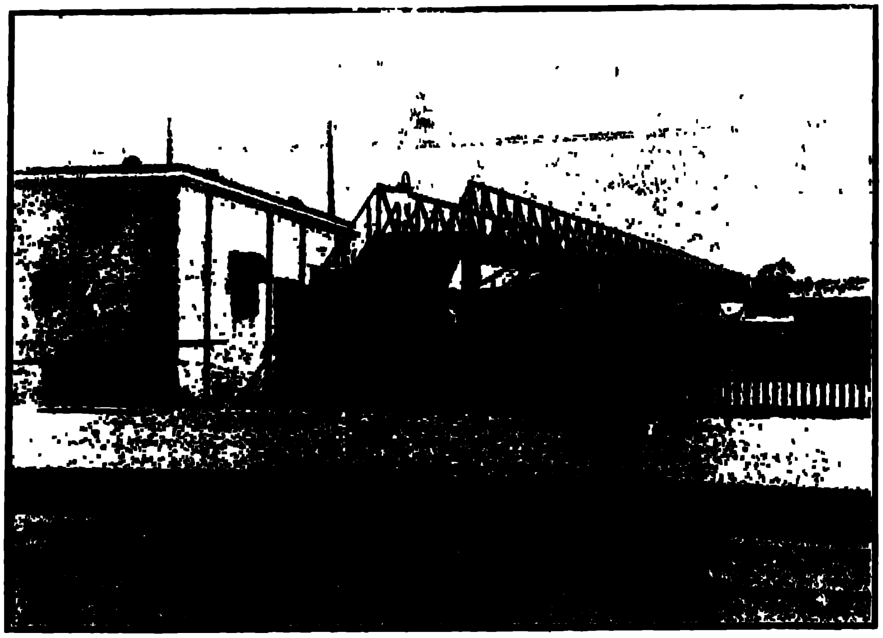
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Foot Overbridges.



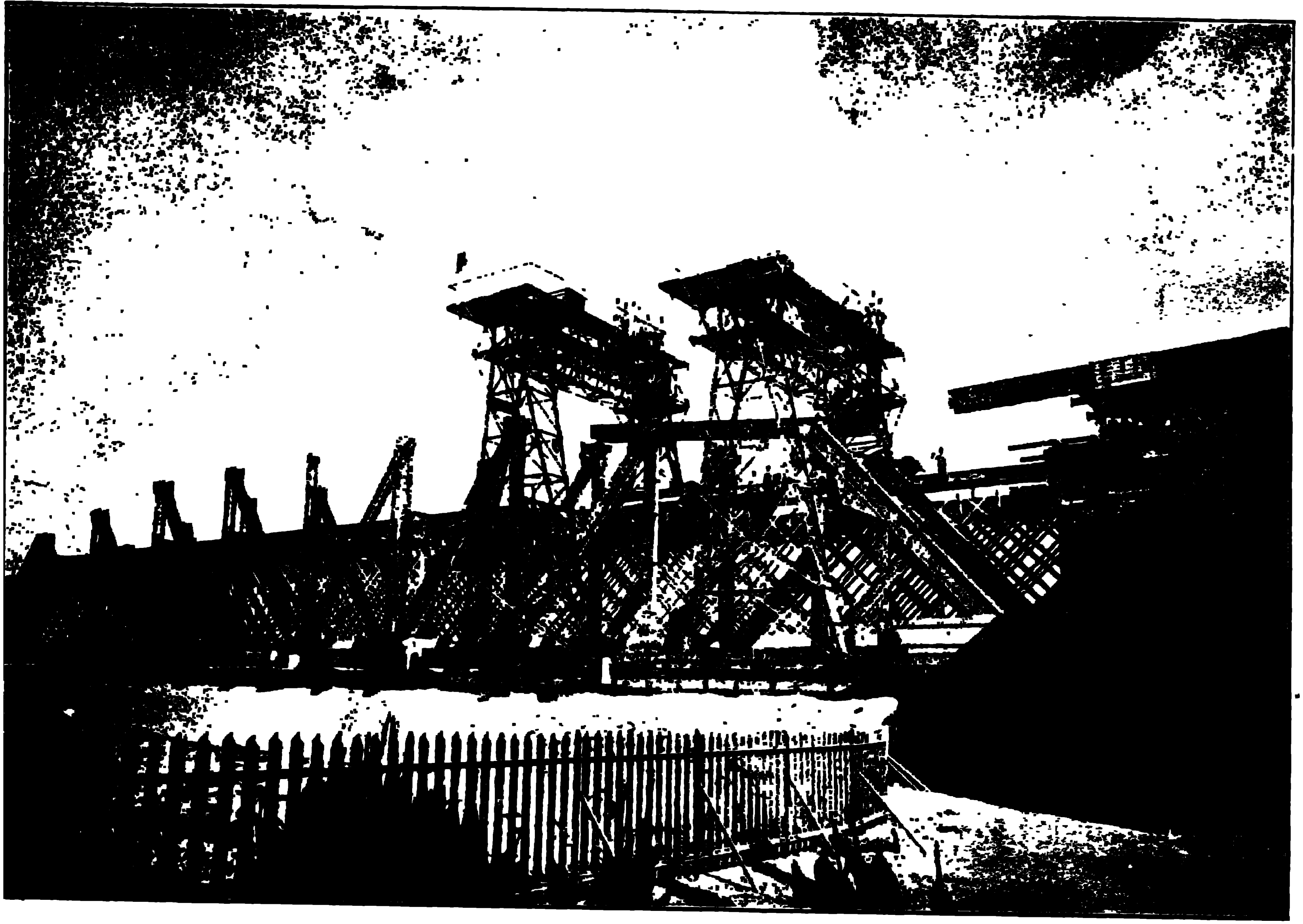
View showing Bridge spanning the four Platforms of the (new) Sealdah North Station and opening on to Old Station Platform.



View showing Bridge opening on to Old Station Platform.

The foot overbridge illustrated on this page was supplied and erected by us for the Eastern Bengal Railway at their new terminus, Sealdah North Station, and is one of many of the same type supplied by us to this and other Railways in India.

Erection Tackle.



Delhi-Jumna Bridge, showing Staging and Gantry.

The Staging and Gantry were built in 1911 at our Howrah Works to the order of the Chief Engineer, East Indian Railway, in connection with the widening of the Jumna Bridge at Delhi, where the traffic had outgrown the existing arrangements of a single track and

Road Bridges.

The illustrations on the following pages show a Bridge, 265 feet long with 10 feet roadway over the (tidal) Pauktaing Chaung for the Superintending Engineer, Maritime Circle, P. W. D., Rangoon. This bridge consists of 4 spans supported by groups of Steel Piles. The work on this, and the other bridges shown on this page was carried out under exceptional difficulties owing to serious transport and labour troubles occasioned by the malarious jungle. The unhealthy nature of the surroundings drove away all imported Riveters and *Khalassies* making it necessary to train unskilled villagers of unsuitable type and character to do the work. Serious floods frequently tested the stability of the temporary wooden stagings, but all difficulties were successfully overcome and the work completed in one season.

The top photograph shows a 50 feet Span Road Bridge with 10 feet Clear Roadway erected at the 15th Mile.

The second photograph shows a 40 feet Span Road Bridge with a 10 feet Clear Roadway which was erected at the 21st Mile.

The lower picture illustrates another 40 feet Span Bridge erected at Kyaukmedaung at the 27th Mile.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY.

Road Bridges. The Pauktaing Chaung Bridge.

Constructed and Erected by Jessop & Co., Ltd., on the Tavoy-Pagaye Road, Burma.

This Photograph shows the old wooden bridge on the left, with a portion of the new bridge under construction on the right.

Riveting the 3rd Span. **Assembling the 1st Span.**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

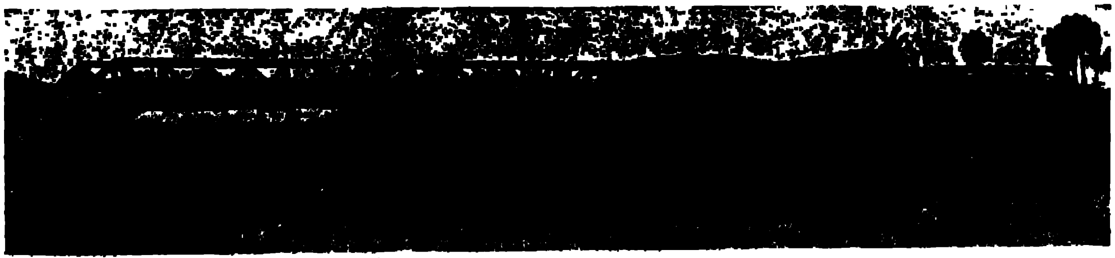
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Road Bridges.

Riveting the 4th Span. Over 32,000 Rivets were driven at site.

Riveting up the Trough Plate Flooring.



The Completed Bridge.

Road Bridges.

Road Bridge in the Orissa Feudatory State.

The illustrations show a Baltimore Truss Bridge of two 200 feet spans.

Roadway 14 feet wide. The Booms are 25 feet vertical depth centre to centre and are carried on fixed and expansion rockers. The total weight of steelwork was approximately 250 tons. This was a repeat order from the State Agency Engineer, to whom we have supplied six duplicate spans as above.

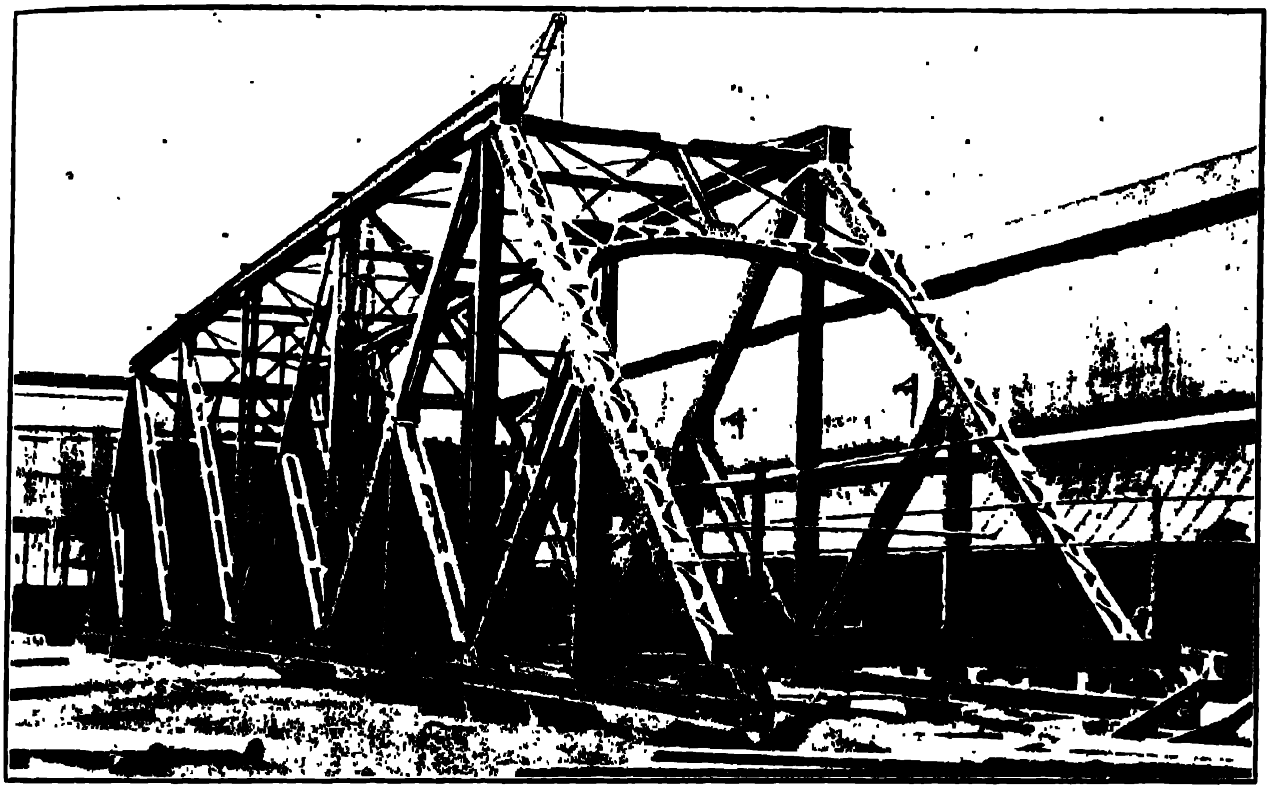
The erection of this bridge presented unusual difficulties. The centre pier is some 60 feet above the water which is always deep. The spans were completely riveted up on shore behind the abutments and were then launched forward, 100 feet of each span cantilivering out beyond the temporary trestles erected from the waters edge, no staging being permissible in the water on account of the sudden and heavy floods to which the river is liable.

ALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

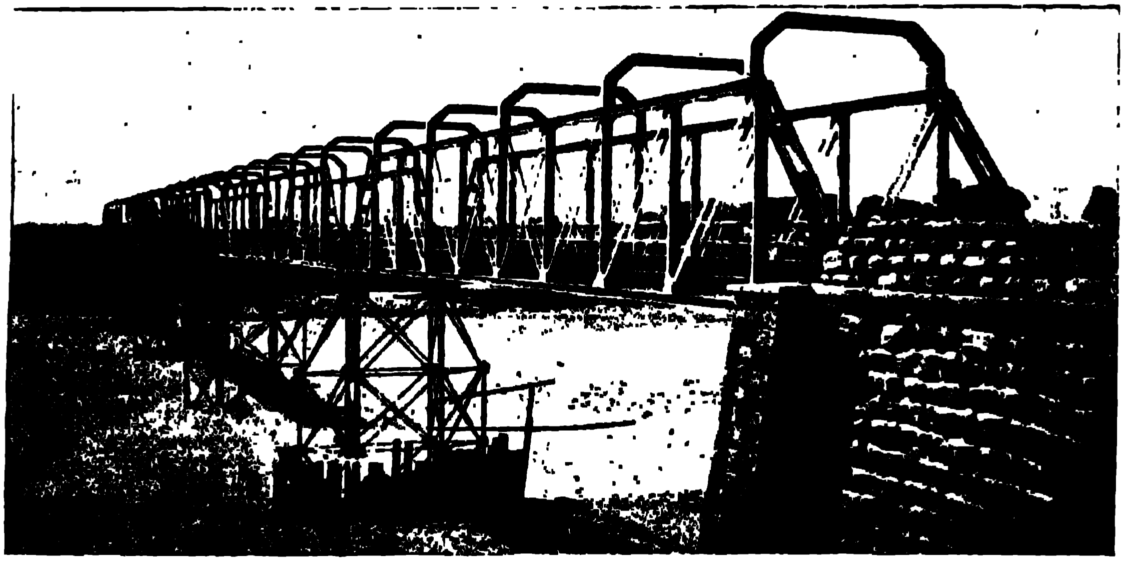
RANGOON, MADRAS,
BOMBAY, LONDON.

Road Bridges.



Girder Bridge for the Orissa Feudatory States (150 ft. Span.)

This is one of a pair of spans designed and constructed by us. The design is unusual in that it does not involve the use of any steel plates. During the war plates were almost unobtainable in India, and were at famine prices. The spans are constructed wholly of Channels, Beams, Angles and small Flats.



Barakar River Road Bridge.

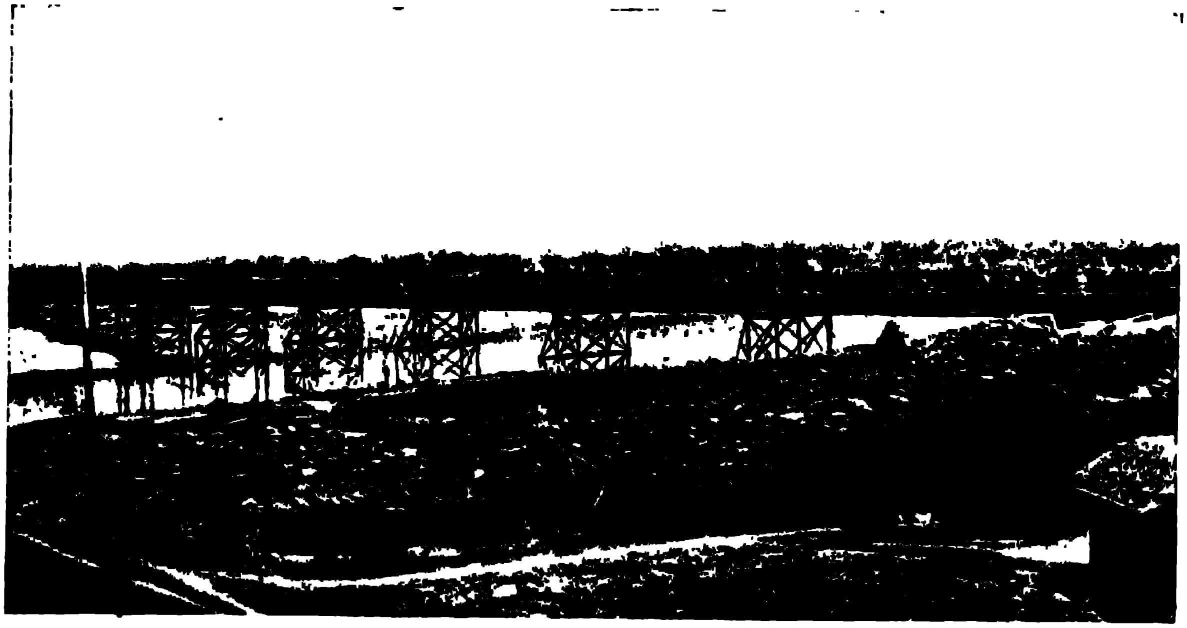
Main details of this bridge are as follows:—Five spans of 105 feet between centres of piers. Roadway 10 feet clear. Headroom under overhead bracing 14 feet to road level. The bridge is carried on Screw Pile Piers. Designed and erected by us.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

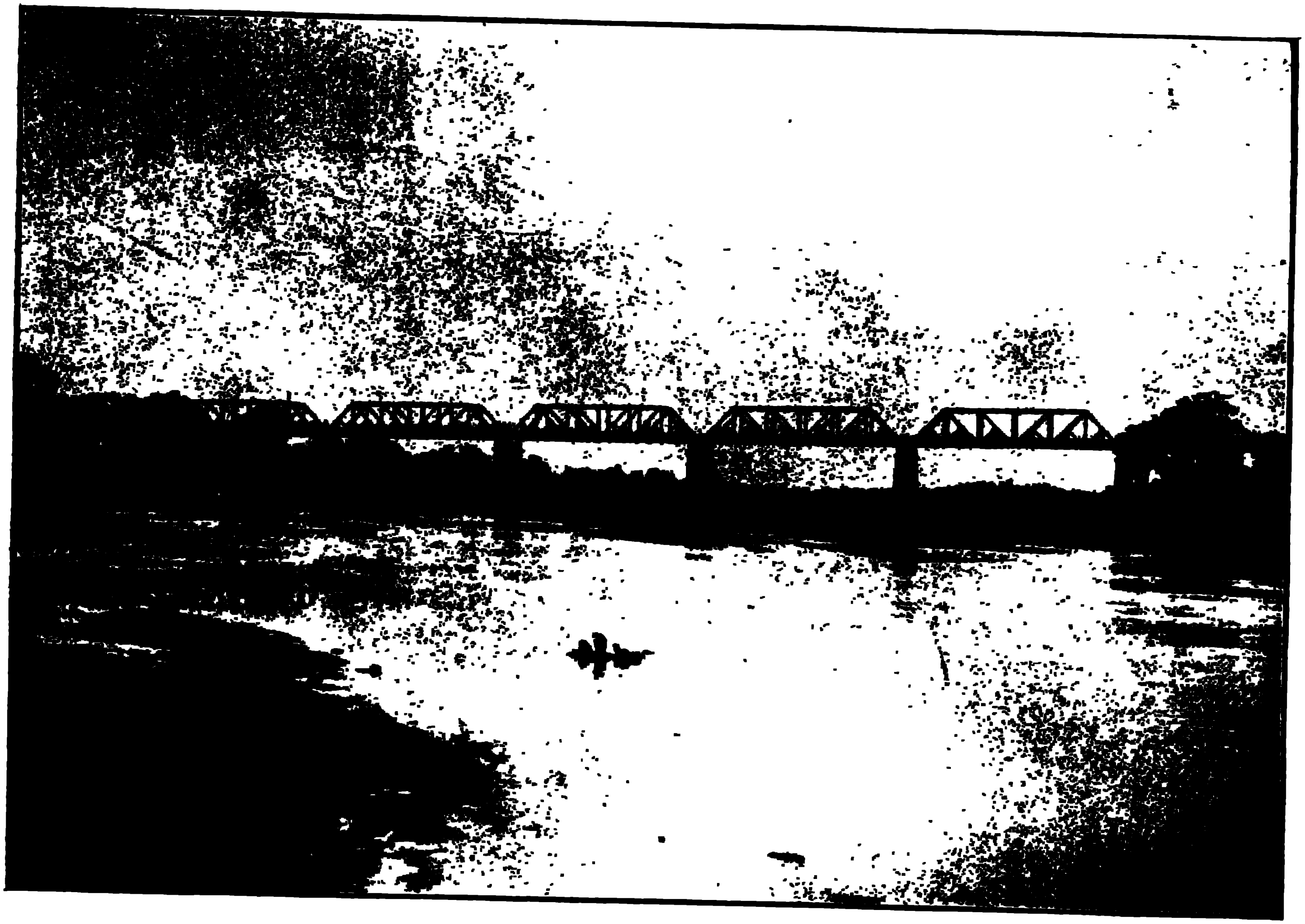
Road Bridge, Chanpatia, Champaran District, Bihar.



The above illustration is of a Lattice Girder Bridge 609 feet long, designed and erected by us. There are 9 main spans of 62 feet 6 inches each, and at each end an approach span of 23 feet 3 inches, the width of roadway being 15 feet between girder centres. The whole structure is supported on solid steel screw piles, there being 10 main piers and 2 abutment piers, the former being provided upstream with fender piles for protection from drifting trees, etc.

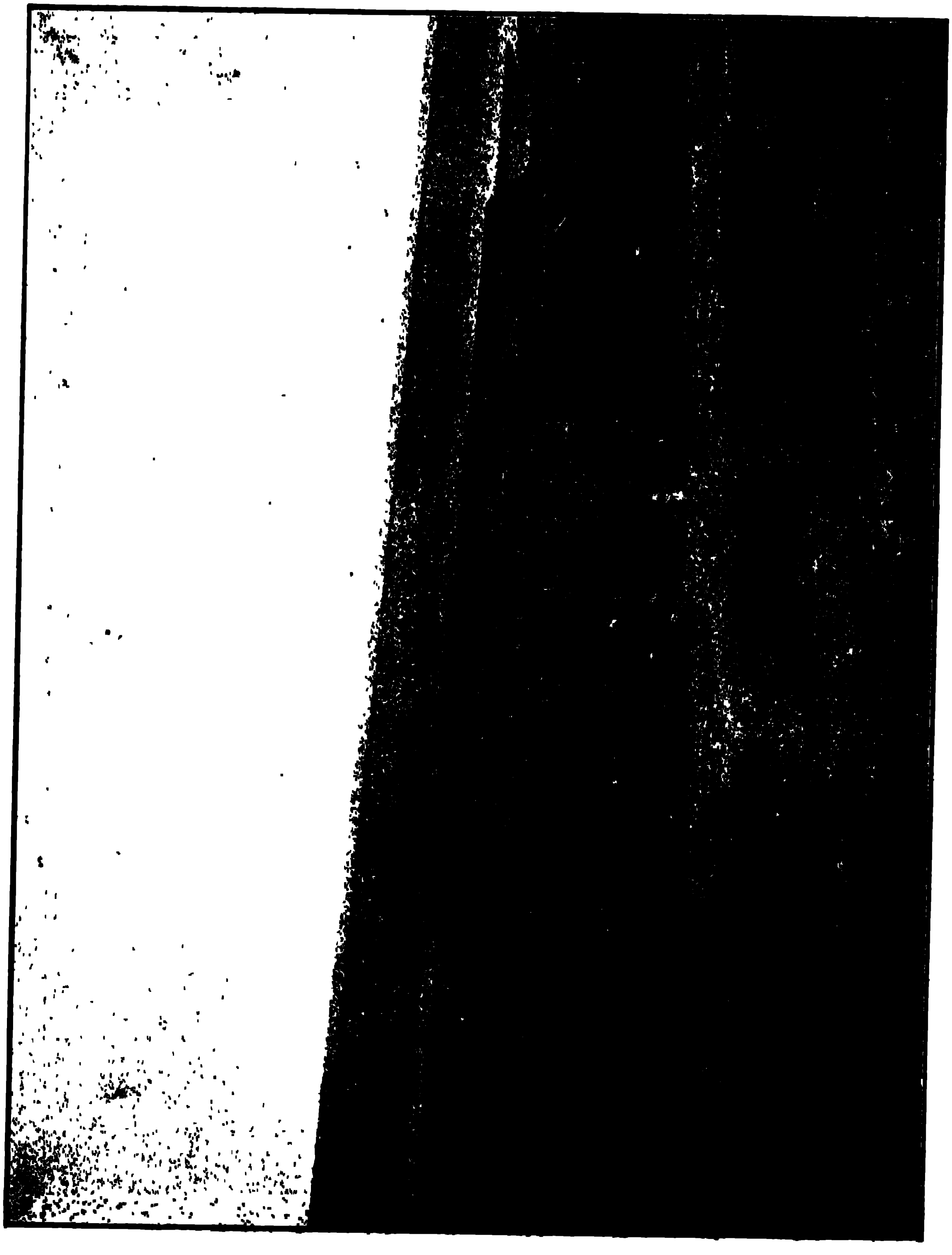
Owing to the liability of the river to serious floods, many difficulties had to be overcome during the erection. The whole countryside is subjected to inundation almost to the top of the protective bund shown in the foreground, and the current through the bridge is specially rapid on account of the proximity of a large railway bridge. So severe was this current that the river bed was on one occasion scoured out to a depth of over 20 feet in the centre during erection necessitating the re-screwing of several of the piers.

Road Bridges.



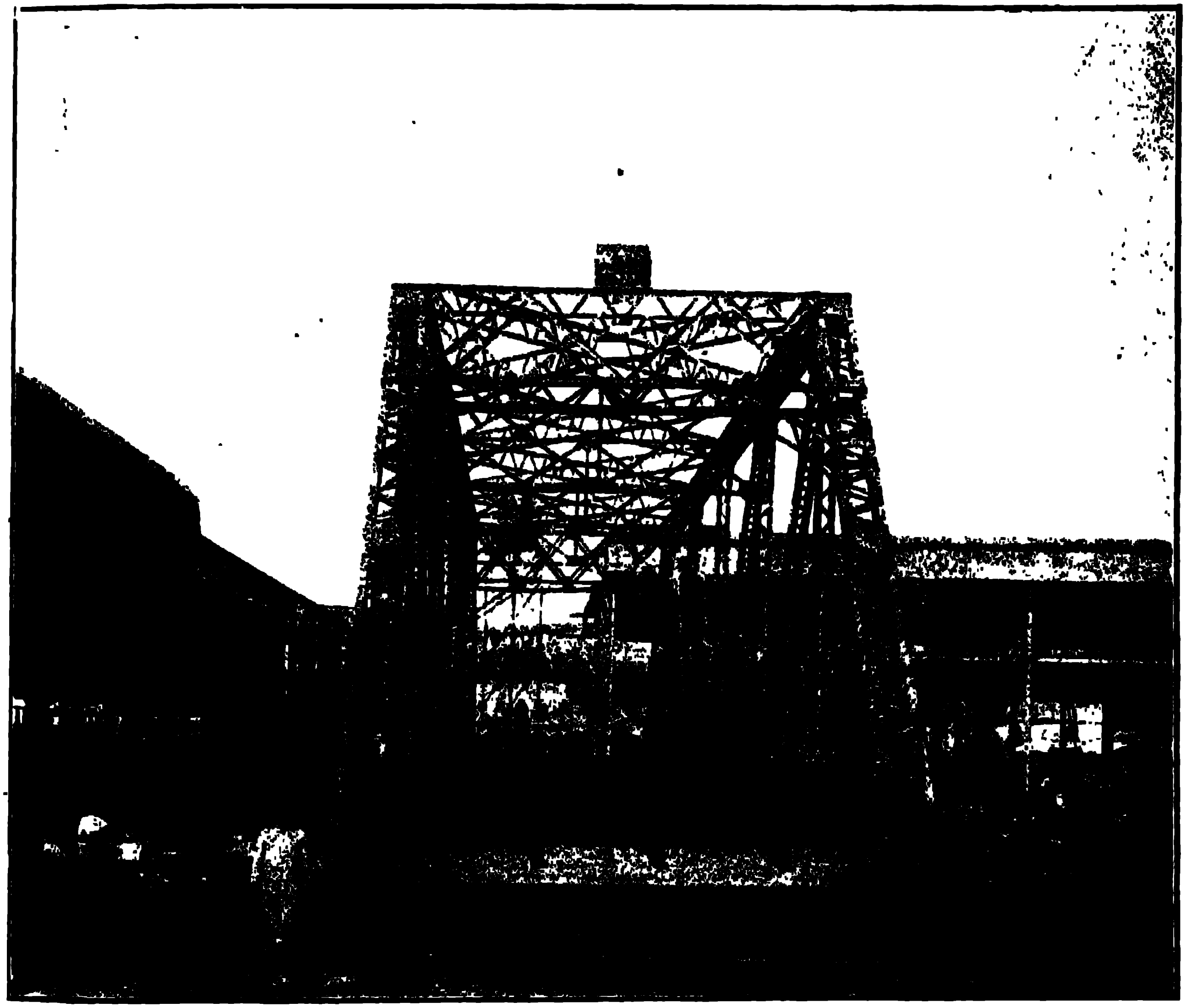
This illustrates a bridge just designed, constructed and erected by us over the Barakar River. It has five spans of 100 feet, and two approach spans of 60 feet. Roadway 16 feet. Designed for heavy road traffic.

Road Bridges.



Damoodar River Road Bridge.

Road Bridges.



The photographs on this and the opposite page are of one span during shop assembly of a bridge of 8 spans of 150 feet and 16 feet roadway to the order of the District Engineer, Manbhoom. One span is shown from the side and also from the end. The flooring is of steel troughing pressed by us, and is designed to carry all modern motor lorry and trailer traffic.

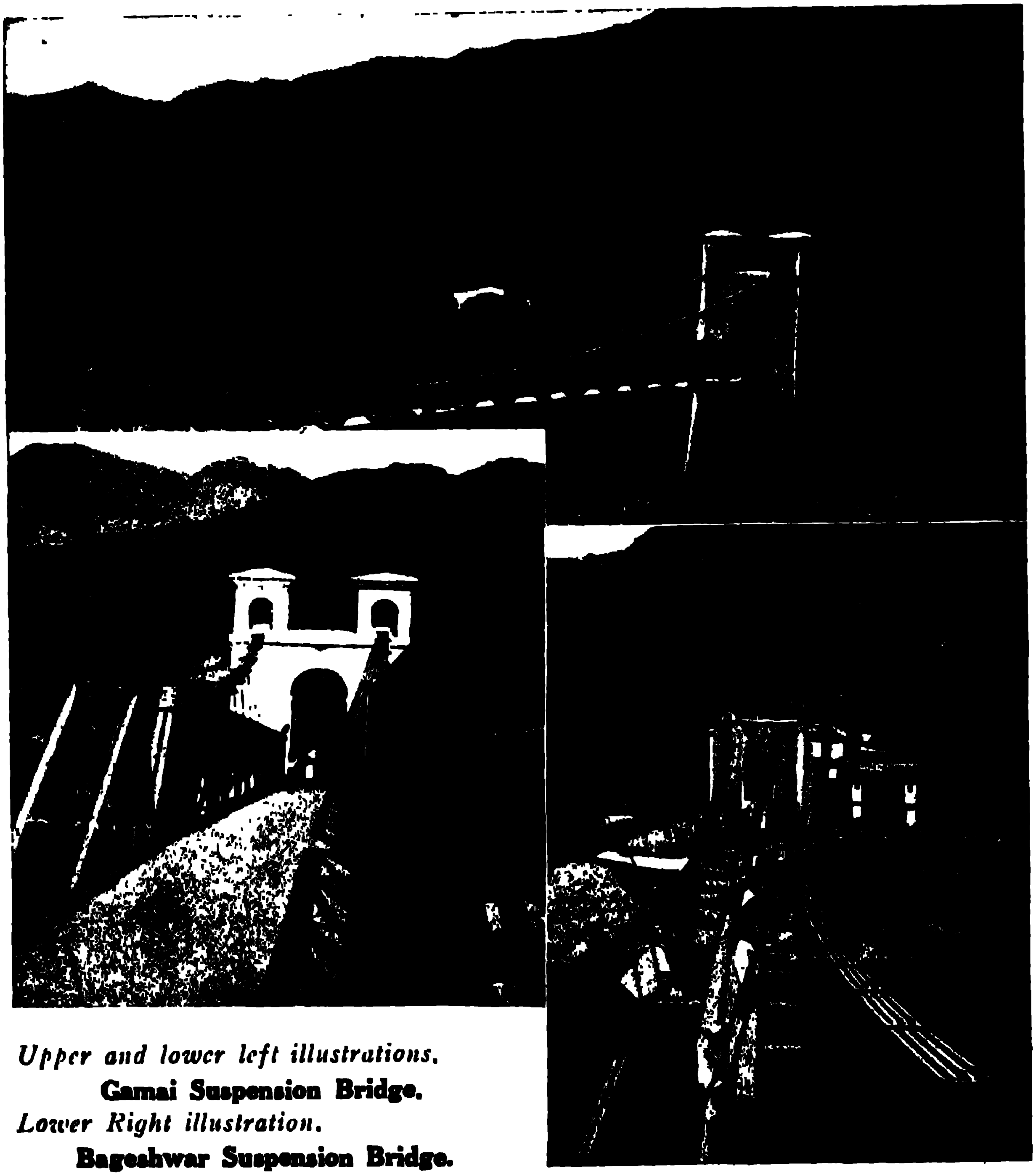
The bridge was designed and erected by us over the Damoodar River.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

BOMBAY, LONDON.

Suspension Bridges.



Upper and lower left illustrations.
Gamai Suspension Bridge.
Lower Right illustration.
Bageshwar Suspension Bridge.

Suspension Bridges.

The Suspension Bridge under many circumstances offers the most simple and economical solution to the problem of carrying a roadway over a river or ravine. Especially is this so in mountainous country where the traffic is not sufficiently great to warrant the expenditure of more money than is absolutely necessary on any projected roadway, and the difficulty of transport and erection combined with the initial cost would render prohibitive the construction of any other type of bridge.

Suspension Bridges may be constructed to meet almost any requirements as regards span, width, or nature of loading, and in all cases the cost will be found much lower than that of a corresponding bridge of the Lattice Girder or any other well-known type.

To facilitate transport over rugged country they may be packed in small pieces while the erection may be completed with very indifferent labour and in a remarkably short space of time.

In cases where great rigidity is not essential the platform of the bridge may be constructed of very light materials, the loading never being of such a concentrated or rapidly moving nature as to cause serious distortion of the cables from their position of natural equilibrium. This constitutes the cheapest and the lightest type of Suspension Bridge available, and, in districts where timber is plentiful, the only parts which need to be imported are the cables and hanger rods, all the other portions being easily made locally.

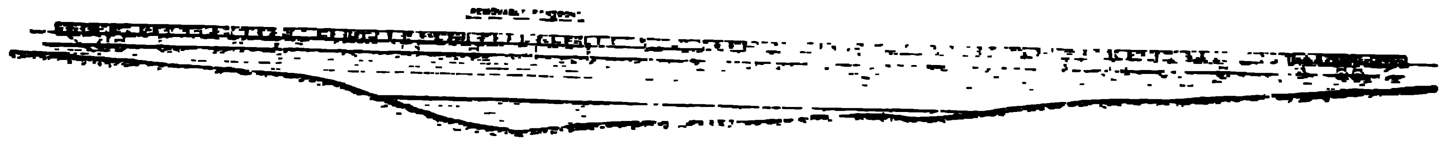
Should, however, the traffic be heavy, it would be necessary to adopt the Stiffened Suspension Bridge, in which, by means of longitudinal girders, the irregularities of loading are counteracted and distortion of the platform and main cables is prevented. The stiffening girder may be continuous from bank to bank, or, as is preferable for many reasons, it may be pin-jointed in the centre. The introduction of this form of construction, of course, increases the cost of the structure.

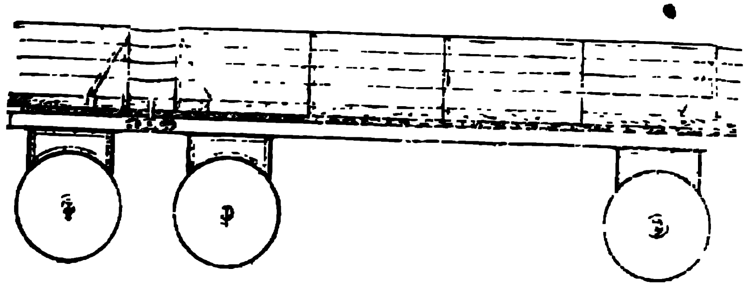
The Suspension Bridges illustrated on the previous page are good examples of the stiffening girder type of Suspension Bridge. These Bridges were built by us for the Almora District, to which we have supplied a large number of similar type and varying spans.

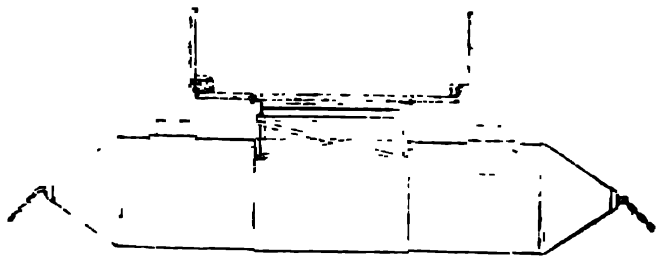
We have, during past years, supplied Suspension Bridges of both light and stiffened girder types to various parts of the country including five bridges supplied to the Public Works Department for the frontier roads in the Abor country.

Estimates for Suspension Bridges will be furnished on receipt of information regarding the cross section of any river, the nature of the banks, the high flood levels, width of roadway and the weight of traffic.

Pontoon Road Bridges.







For bridging wide but placid streams where no great headway is required, the Pontoon Bridge will be found to be most economical. The above illustrates a bridge supplied by us to the Kapurthala State, and which has since had three spans added to it. The Pontoons are cylindrical, each divided into three water-tight compartments, and are moored fore and aft. The Cross Girders are of rolled steel provided with suitable Saddles to connect on to the Pontoons.

The roadway is of timber laid longitudinally on timber cross beams, and the hand rail consists of angle iron standards with two rows of light guard chain.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

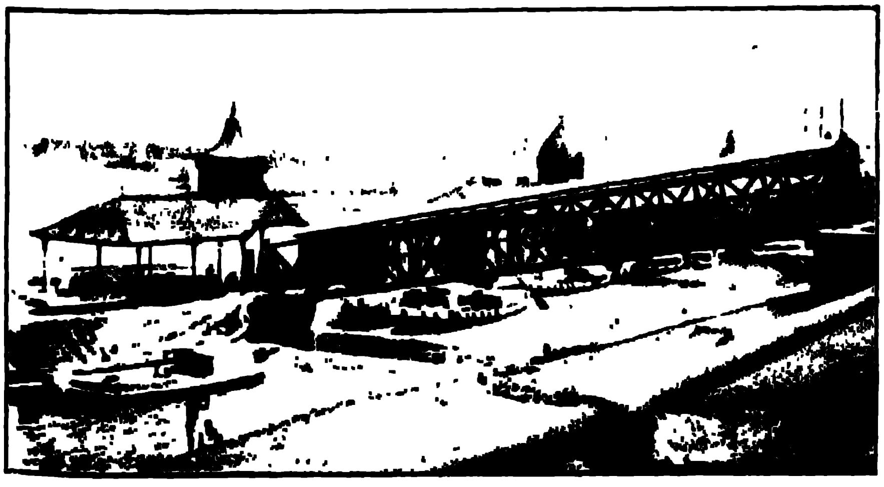
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Pontoon Landing Stage for the Governor's Estate, Barrackpore Park.

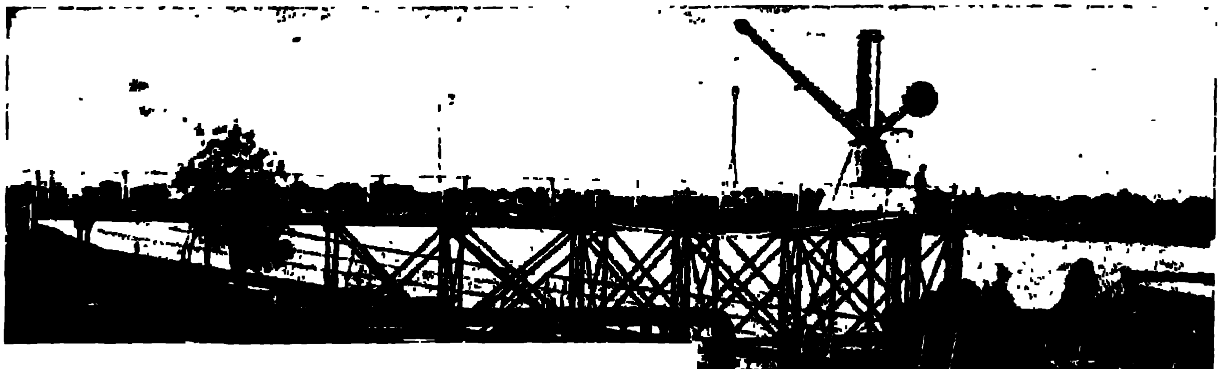
This span which measures 100 feet between centres was recently erected by us at Barrackpore. The shore end rests on rockers on a pile pier foundation while the pontoon anchored in the river accommodates the rise and fall of the tide. In many cases this arrangement is preferable to a fixed structure.

Pontoons and Pontoon Bridges.



The illustration on the left is of one of four Approach Bridges, each 80 feet long by 8 feet roadway, built and erected to the order of the Port Commissioners for their Armenian and other Ghats on the Calcutta side of the Hooghly River.

Jute Mill Jetties.



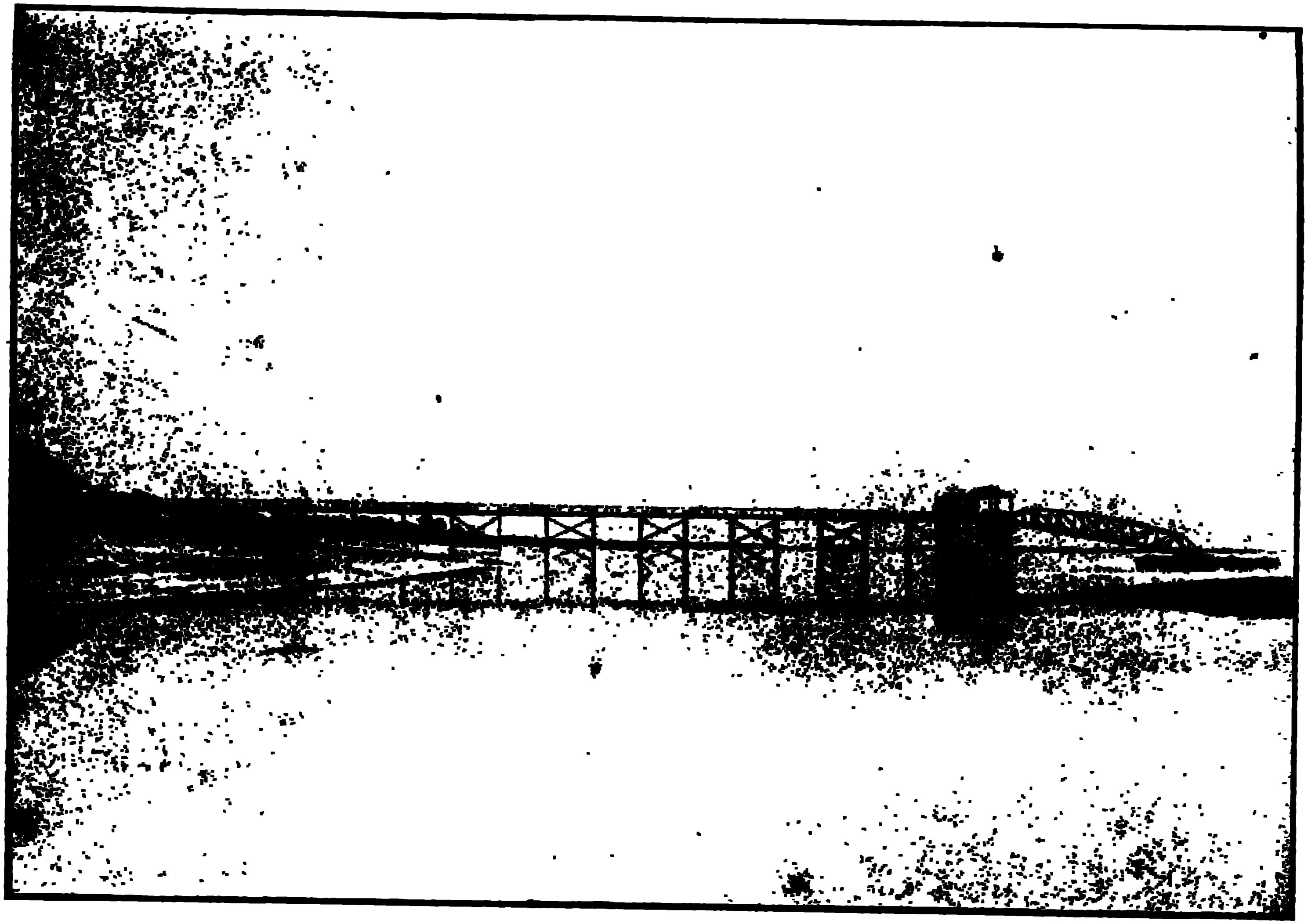
Jetty at Shamnaggar Jute Mill

Fort Gloster Jute Mill Jetty.

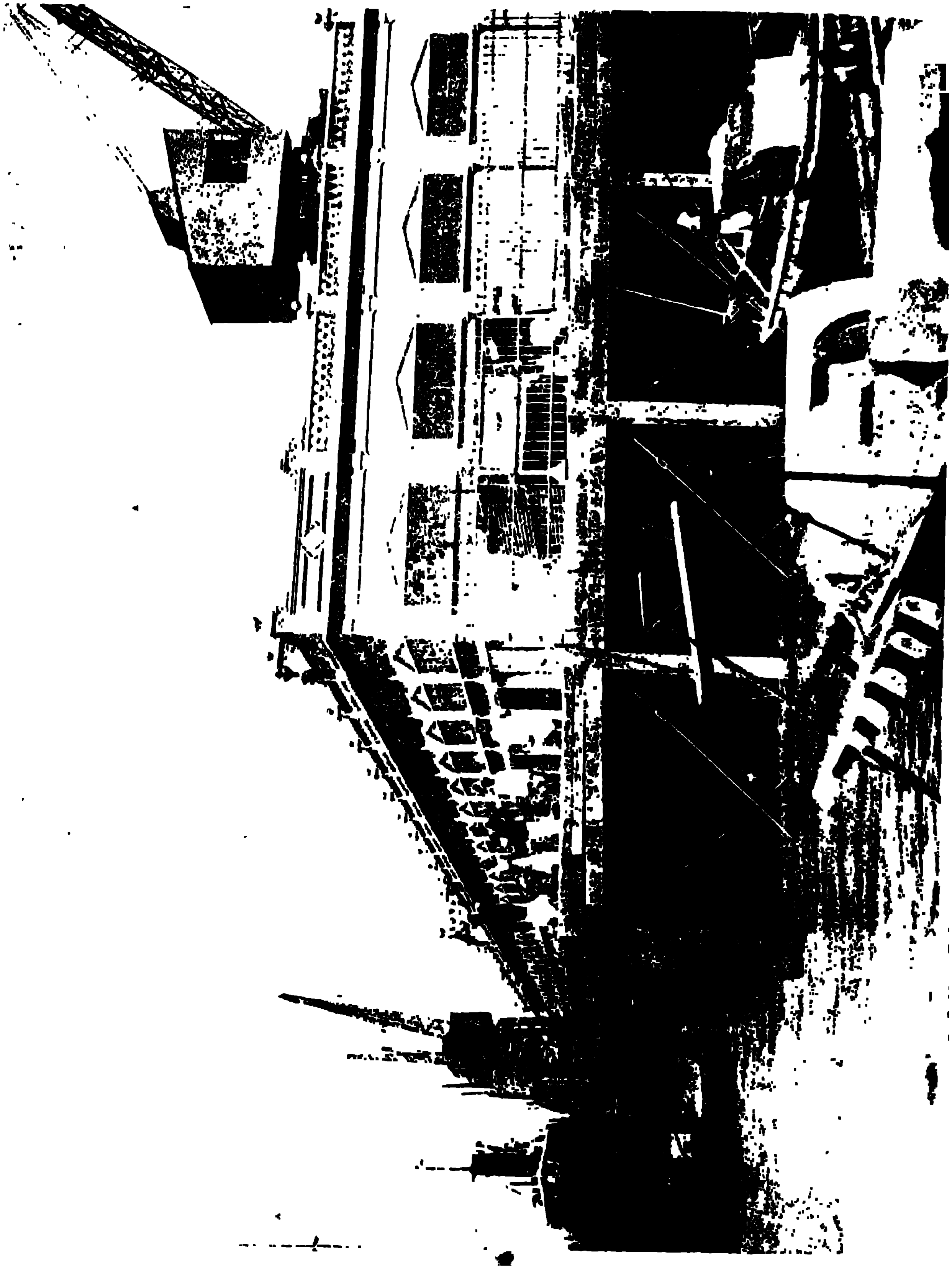
Reliance Jute Mill Jetty

Kelvin Jute Mill Jetty.

Screw Pile Jetty, Girder Bridge and Pontoon Landing Stage.



The above illustrates a Screw Pile Jetty of light construction recently completed by us in Burma. It is fitted at the head with a 100 feet span Swinging Girder Bridge, the other end of which rests on a pontoon anchored in the river. It is intended mainly for passenger and light goods traffic.



Import Jetty and Warehouses.

Import Jetty and Warehouses.

North view from Strand Road of East Face of No. 9 Jetty and Shed, Calcutta.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

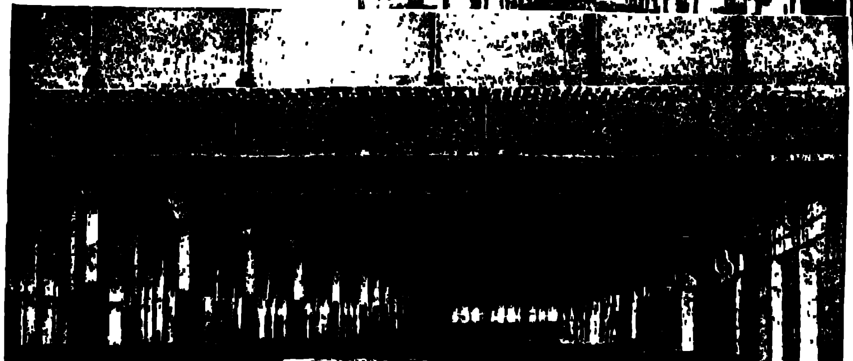
RANGOON, MADRAS,
BOMBAY, LONDON.

Import Jetties and Warehouses.

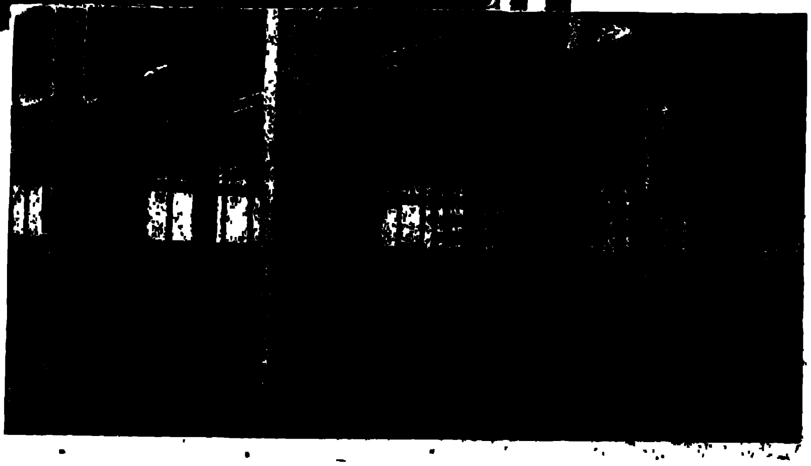
No. 8 Jetty, Calcutta.

This shows No. 8 Jetty in course of erection and gives some impression of the magnitude of the structural work entailed.

Interior view of No. 29 Jetty Warehouse.



Interior view of No. Jetty Warehouse.



A corner of No. 2 Jetty, Calcutta.

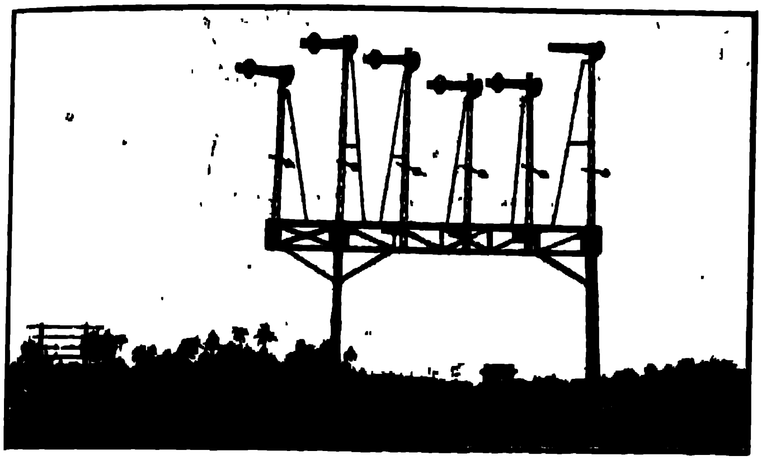
This jetty was constructed simultaneously with Nos. 9 and 29. The warehouse and jetty measure 330 feet long by 200 feet wide. This was **the first warehouse** constructed for the Port Commissioners with Reinforced Concrete Walls.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

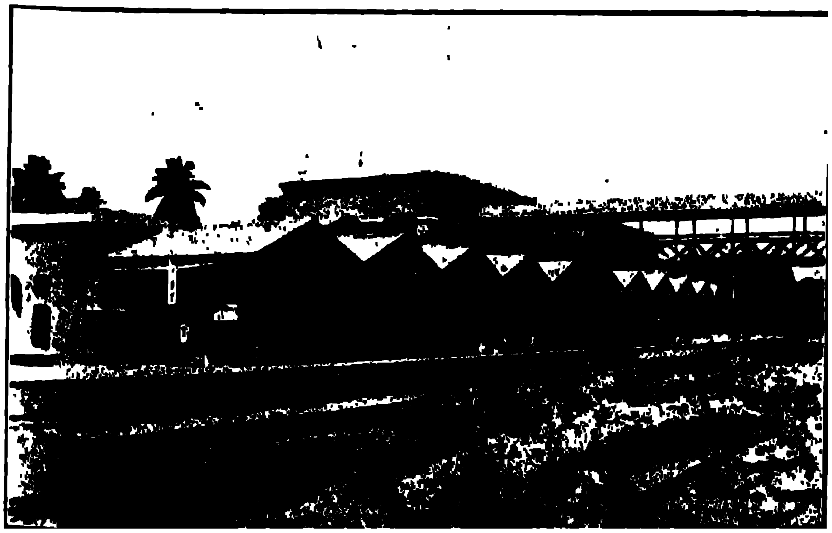
RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Structural Works.



Signals and Signal Bridge on the E. B. Railway.

A Locomotive Running Shed for the Calcutta Port Commissioners.



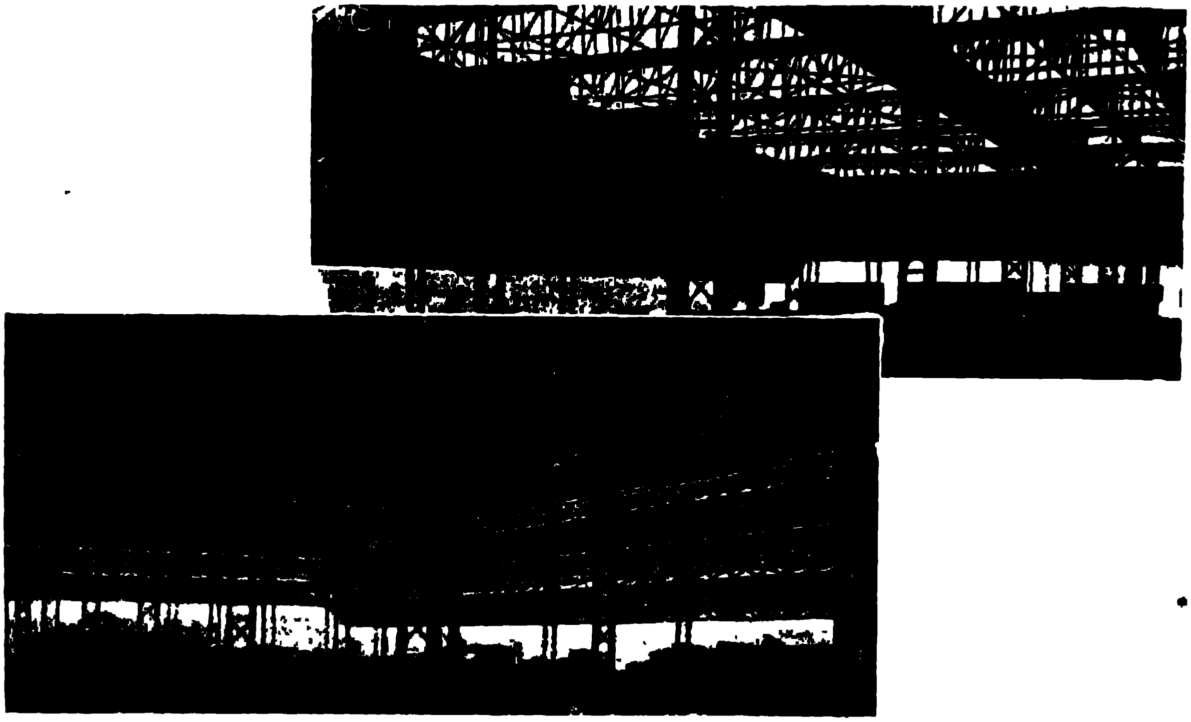
Platform Roof at Naihati, E. B. Railway.

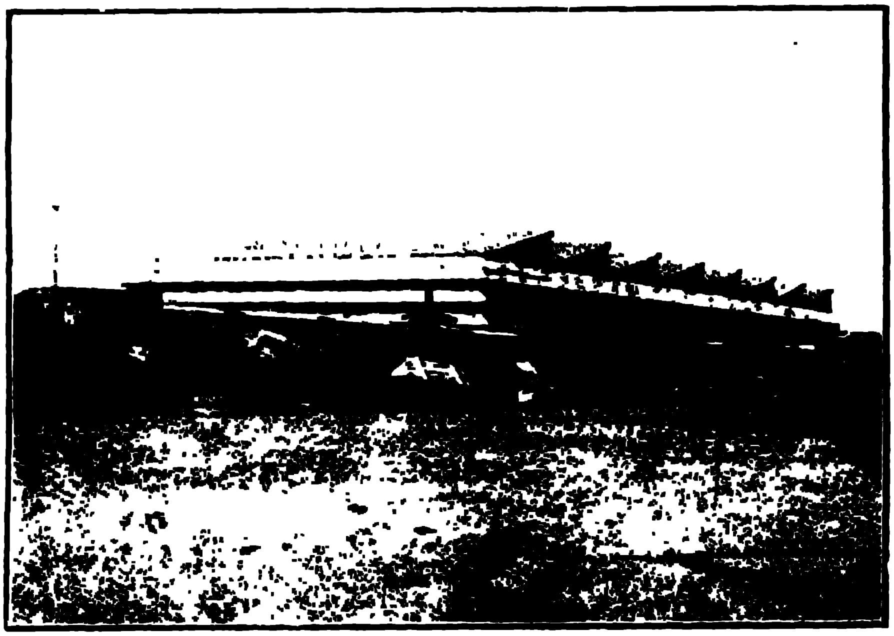
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Workshops.





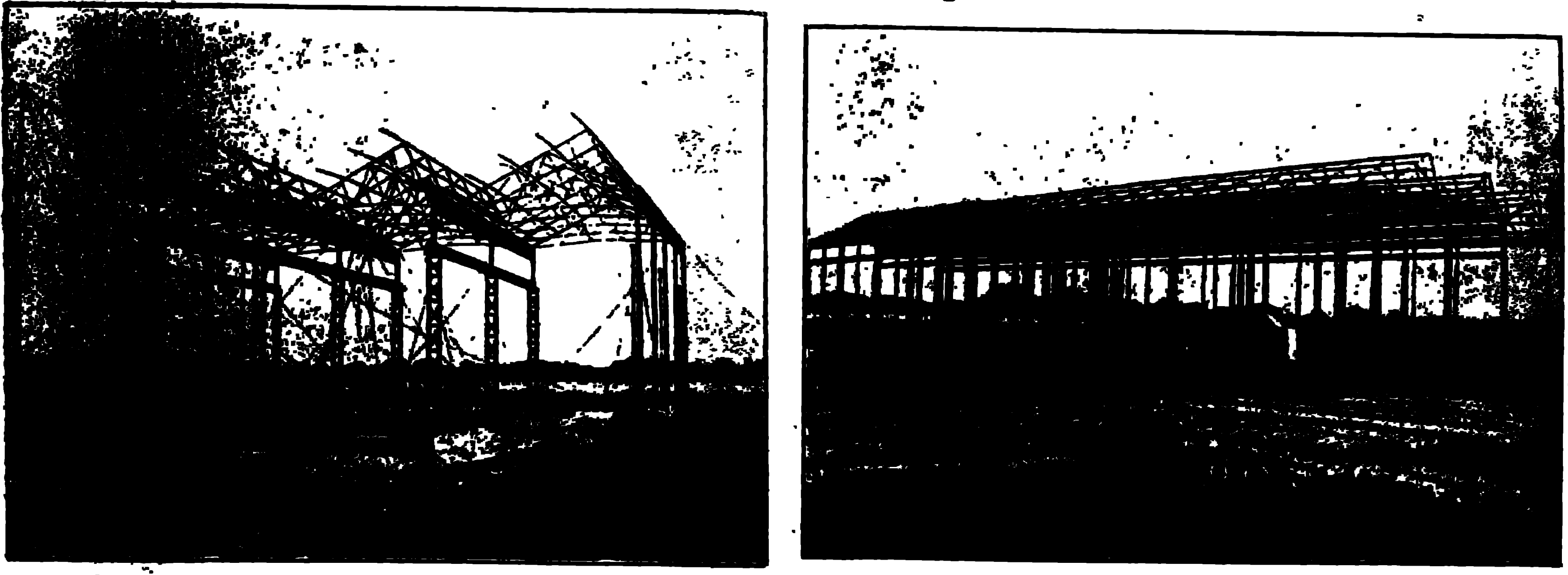
These illustrations are of the Carriage and Wagon Shop, Lillooah, which were constructed and erected by us for the East Indian Railway. It consists of three bays each 320 feet long by 40 feet wide by 34 feet 6 inches high to eaves, and is equipped with Overhead Cranes running on tracks 25 feet above the ground. The shop is very amply provided with North light glazing, and is completely louvred on all four sides up to eaves level.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW;

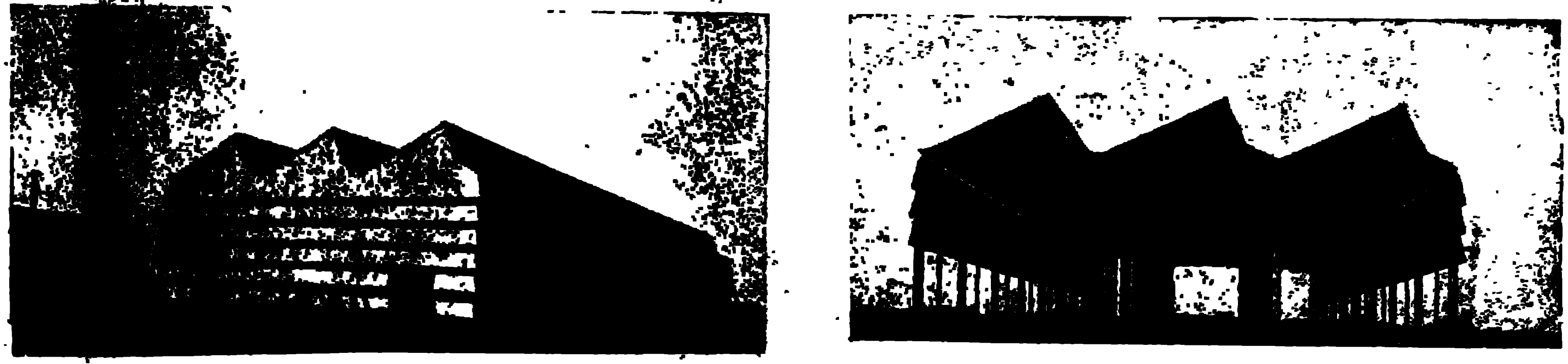
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Workshops.



Steelwork in course of erection for all three bays.



Steelwork and sheeting of all three bays completed.

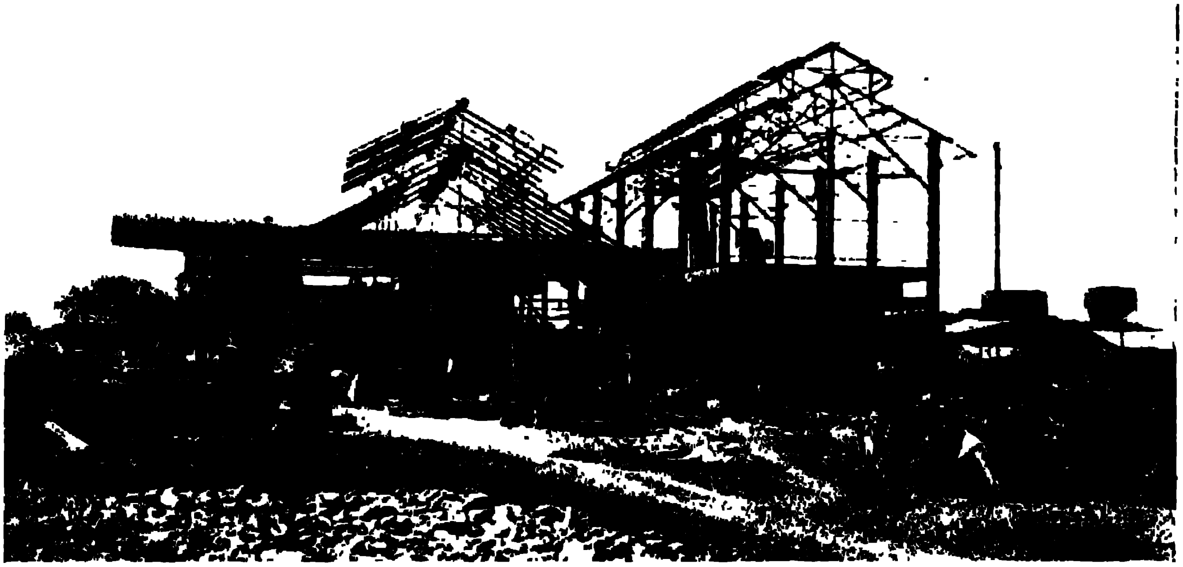
The above views are of the Machine Shops supplied and erected by us for the Eastern Bengal Railway at Kanchrapara. The building is 360 feet long by 129 feet wide being composed of three bays each 43 feet wide. The building is exceptionally high, the clear headroom below trusses being 42 feet while from the top of the roof to ground level is 57 feet. There is a large continuous north light in each bay and two of the bays carry a line of girders for electric cranes.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

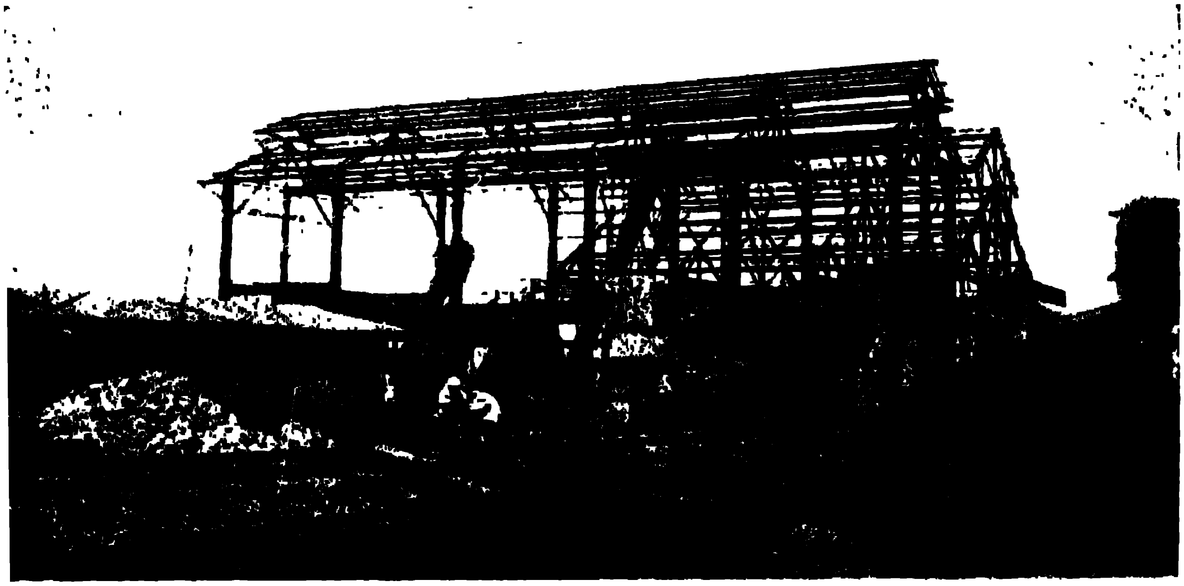
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Jubbulpore Cement Factory.



Wash Mill Building (left) and Crusher Building (right).



Another view of the Crusher Building.

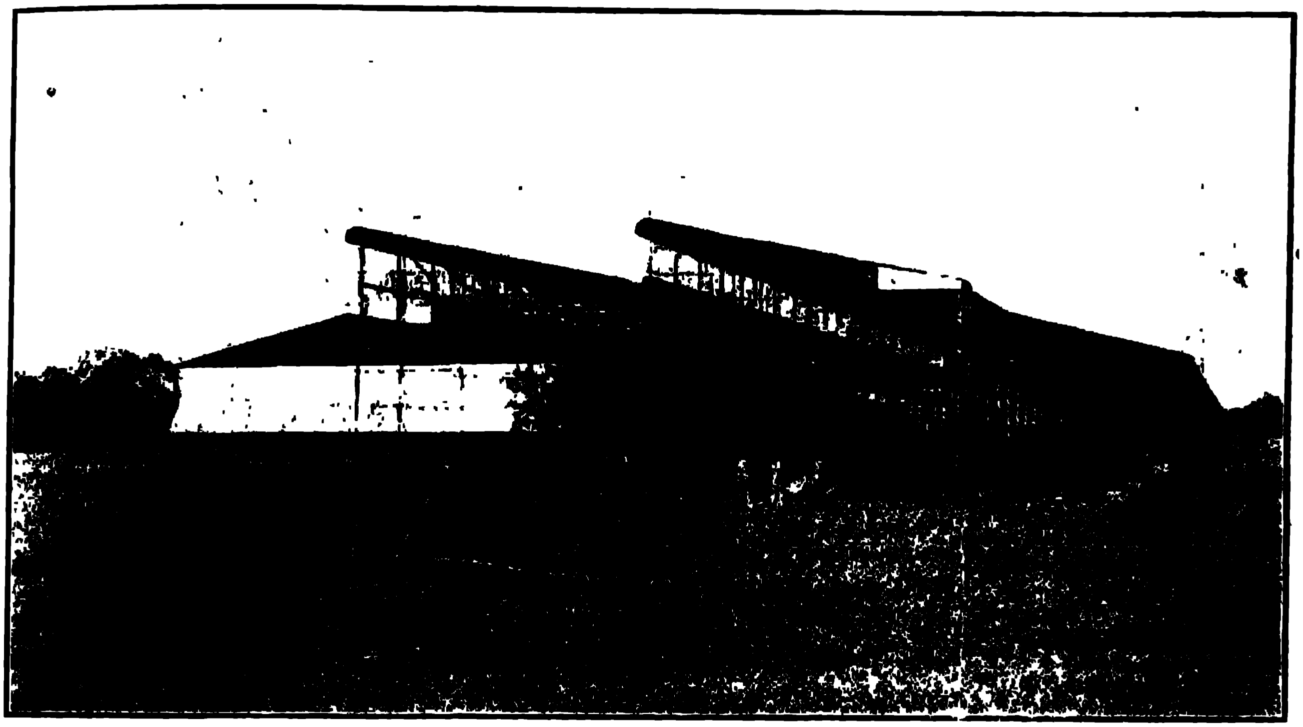
The whole of the steelwork for the above Cement Factory was designed, fabricated and erected by us to suit the requirements of the various portions of the plant itself which was imported from America.

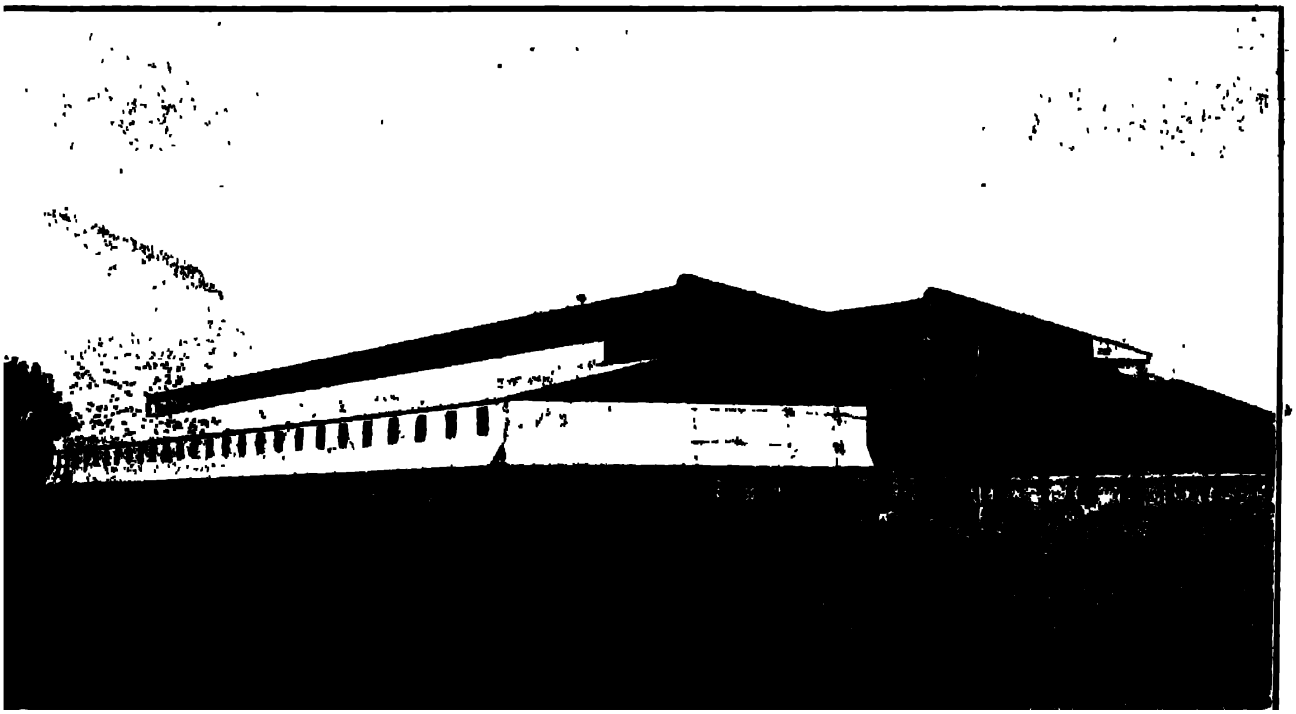
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Workshops for the Sarda Canal Scheme.





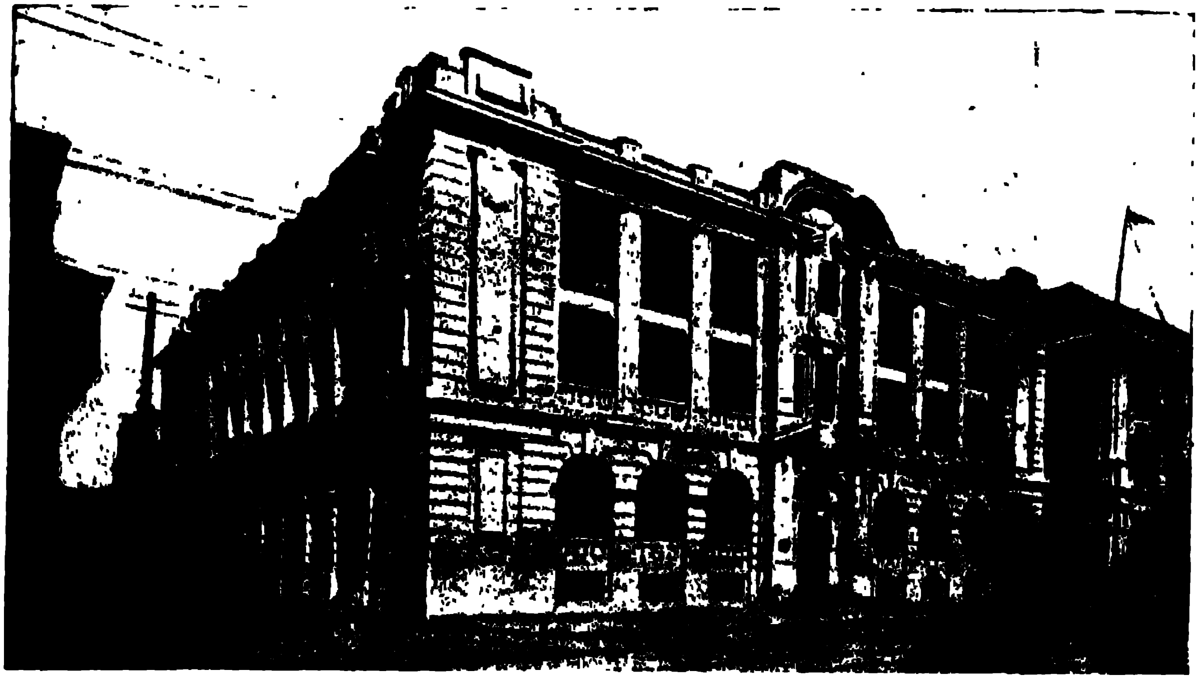
The above illustrations are of a large workshop building recently designed, fabricated, and erected by us in connection with the new Sarda Scheme. The building is 327 feet long by 120 feet wide and special north lights were provided to allow of ample lighting.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

ESS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Framed Buildings.



Offices of the Bombay-Burmah Trading Corporation, Rangoon.

These offices present a very handsome appearance on the river front in Strand Road. Approximate weight of steelwork 400 tons. Designed with a view to the probable addition of another floor.

Dharamsala near Chandpal Ghat, Calcutta.

A welcome riverside rest-house for Indian passengers passing through Calcutta to and from the steamers to Rangoon and the Far East. The cost of the project was Rs. 1,70,000 of which the sum of one lakh was borne by Babu M. L. Bansidhar, a well-known Marwari merchant.

Steel Dome for State Engineer, Rampur.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. ENGINEERS** BOMBAY, LONDON.

Steel Framed Buildings.

Imperial Bank of India, Calcutta Office.

We designed and erected the steelwork for this handsome building. It occupies a prominent position in Strand Road adjacent to the Eden Gardens.

The Calcutta Royal Exchange in the course of erection.

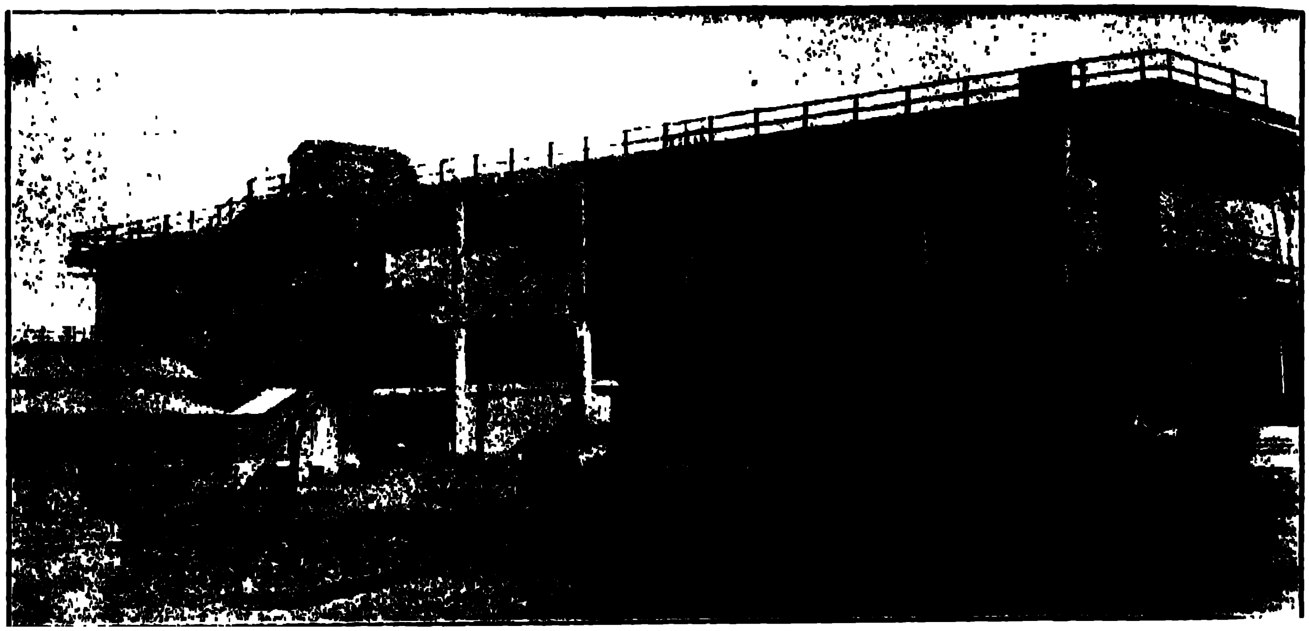
The steelwork for this building was also designed and erected by us. The Exchange is one of the many fine buildings which adorn Clive Street, the chief business centre of Calcutta.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

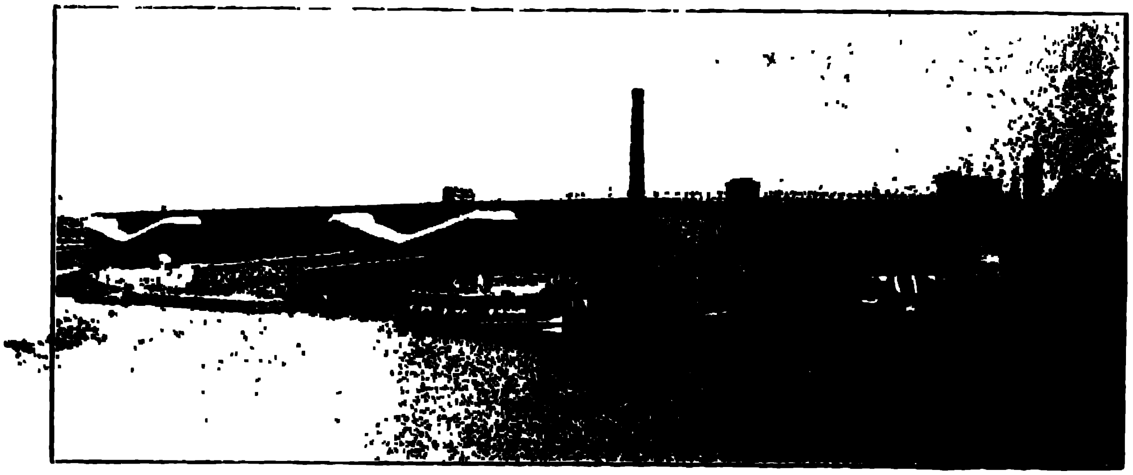
RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Framed Buildings.



Transit Shed "A."

The illustrations on this page are of a Double-Storied Warehouse known as Transit Shed A with steel framework and floors and reinforced concrete walls constructed to the order of the Port Commissioners.



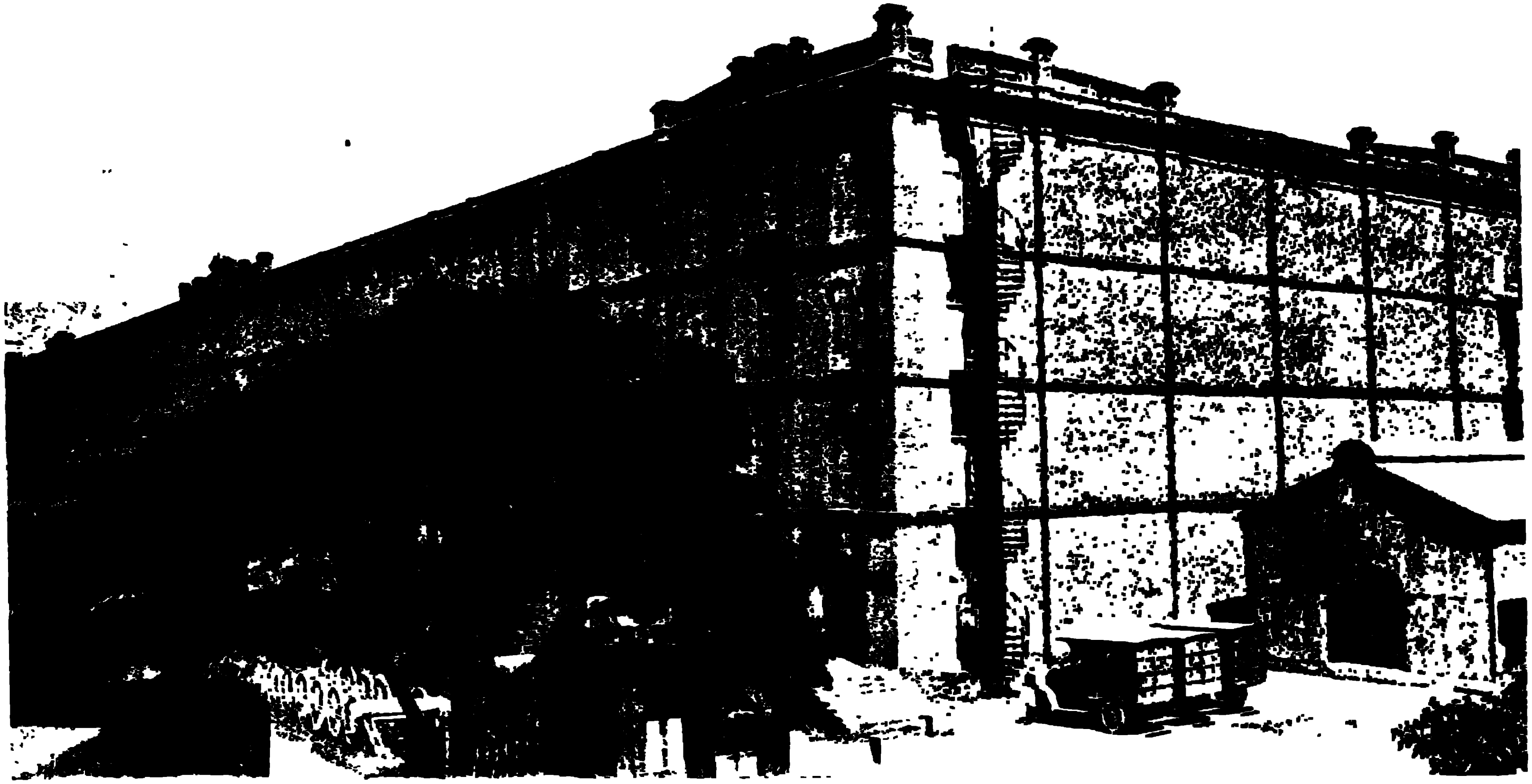
The shed is situated about a quarter of a mile north of the Howrah Bridge on the Calcutta side of the River Hooghly. The total weight of the steelwork used in the construction was approximately 4,000 tons, and the floor area of the structure approximately 120,000 square feet.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tea Warehouse for the Calcutta Port Commissioners.



The illustration above shows the four-storied Sales Tea Warehouse at Kidderpore. It is a steel-framed building providing a floor space of 327.600 square feet. The steelwork for this building was made and erected by us for the Port Commissioners under three separate contracts secured by us in open competition.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

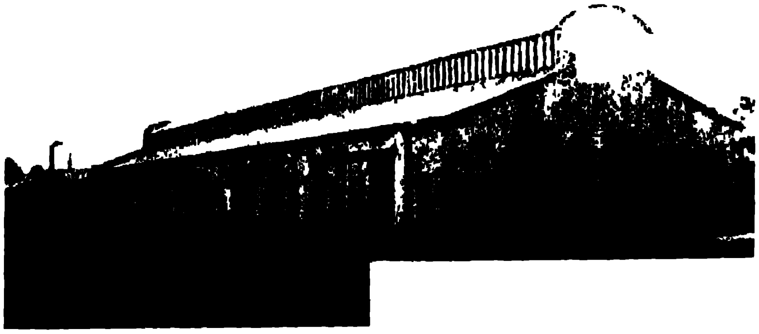
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Warehouses and Godowns.

Jute Storage Sheds for the E. B. Ry. at Cossipur.

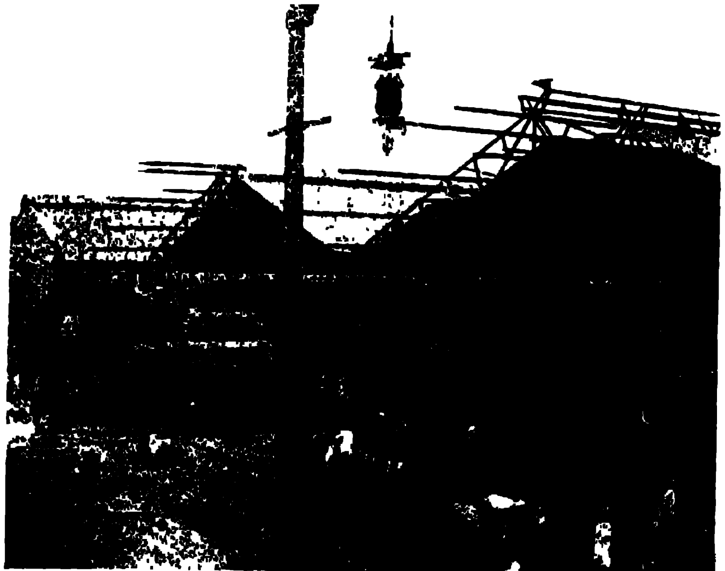
Three sheds each 175 feet long by 40 feet wide. Overall height 23 feet. Fitted with 10 sliding doors 9 feet by 6 feet 6 inches each. As will be noted from the illustration the design makes excellent lighting provision.



Another Jute Storage Shed for the E. B. Ry. at Cossipur.

Length 200 feet, breadth 40 feet, height overall 27 feet. Fitted with 10 sliding doors 8 feet 9 inches by 6 feet 3 inches.

The illustration on the right gives a very limited view of a large and important piece of structural work carried out by us to the order of the E. I. Railway. There are in all four double-storied warehouses for the storage of grain in the Howrah Goods Yard. Each shed is 475 feet long by 77 feet wide and of heavy construction, the total weight being over 2,000 tons. The construction and erection were carried through in record time. Erection proceeded simultaneously on the sheds, and our adherence to the allotted time of three weeks for the erection of each shed earned for us a substantial bonus from the railway company.



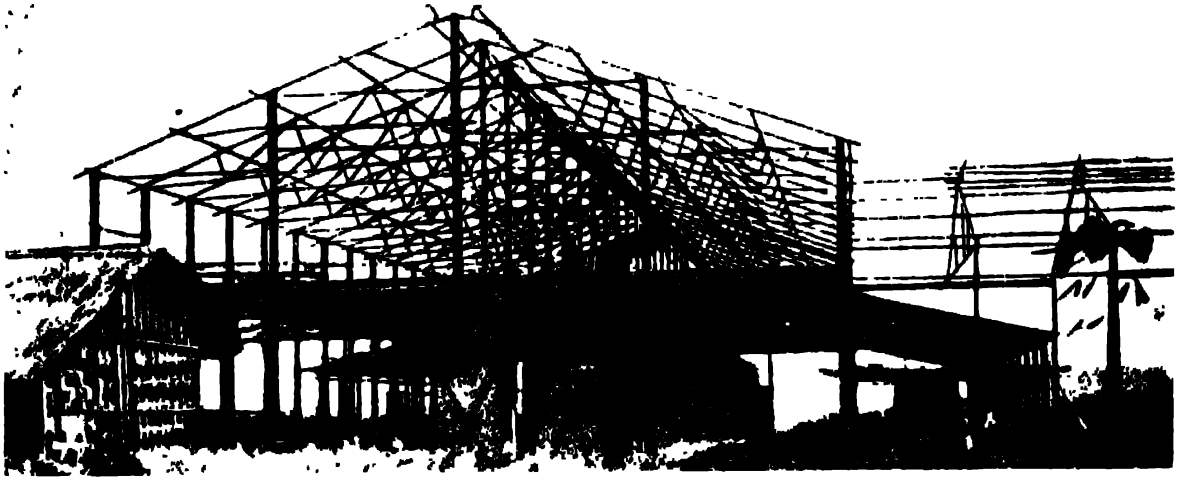
E. I. Ry. Grain Sheds for Howrah.

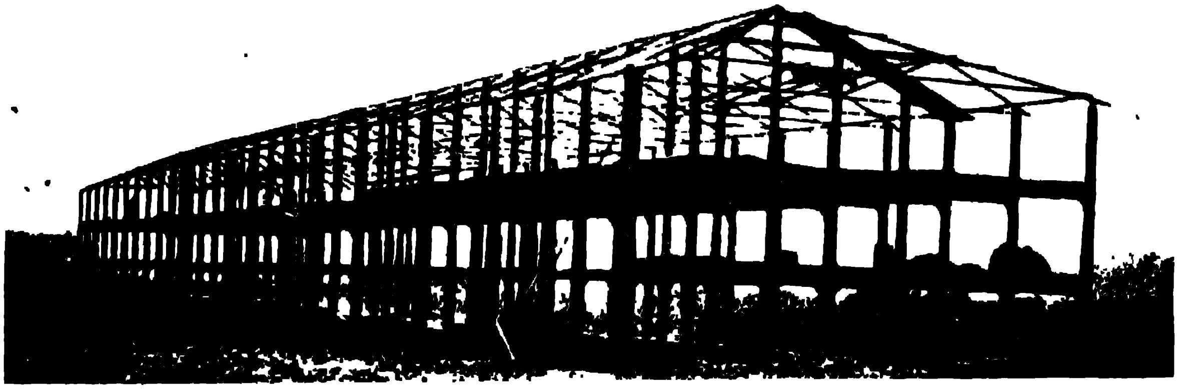
A, JAMSHEDPUR,
HI, LUCKNOW,

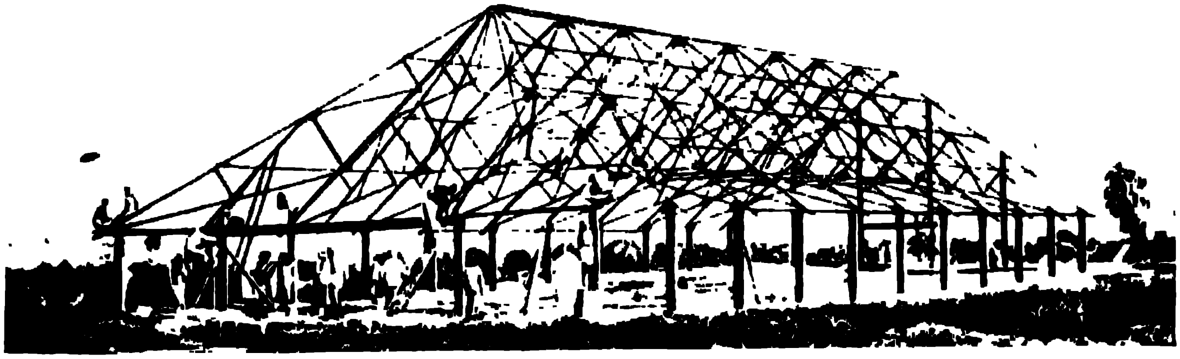
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tea Factories and Buildings.







A Tea Factory. Length 198 feet by 60 feet wide on the centre bay.

Leaf House. Length 310 feet by 36 feet span.

Fermenting House. Length 120 feet by 50 feet span.

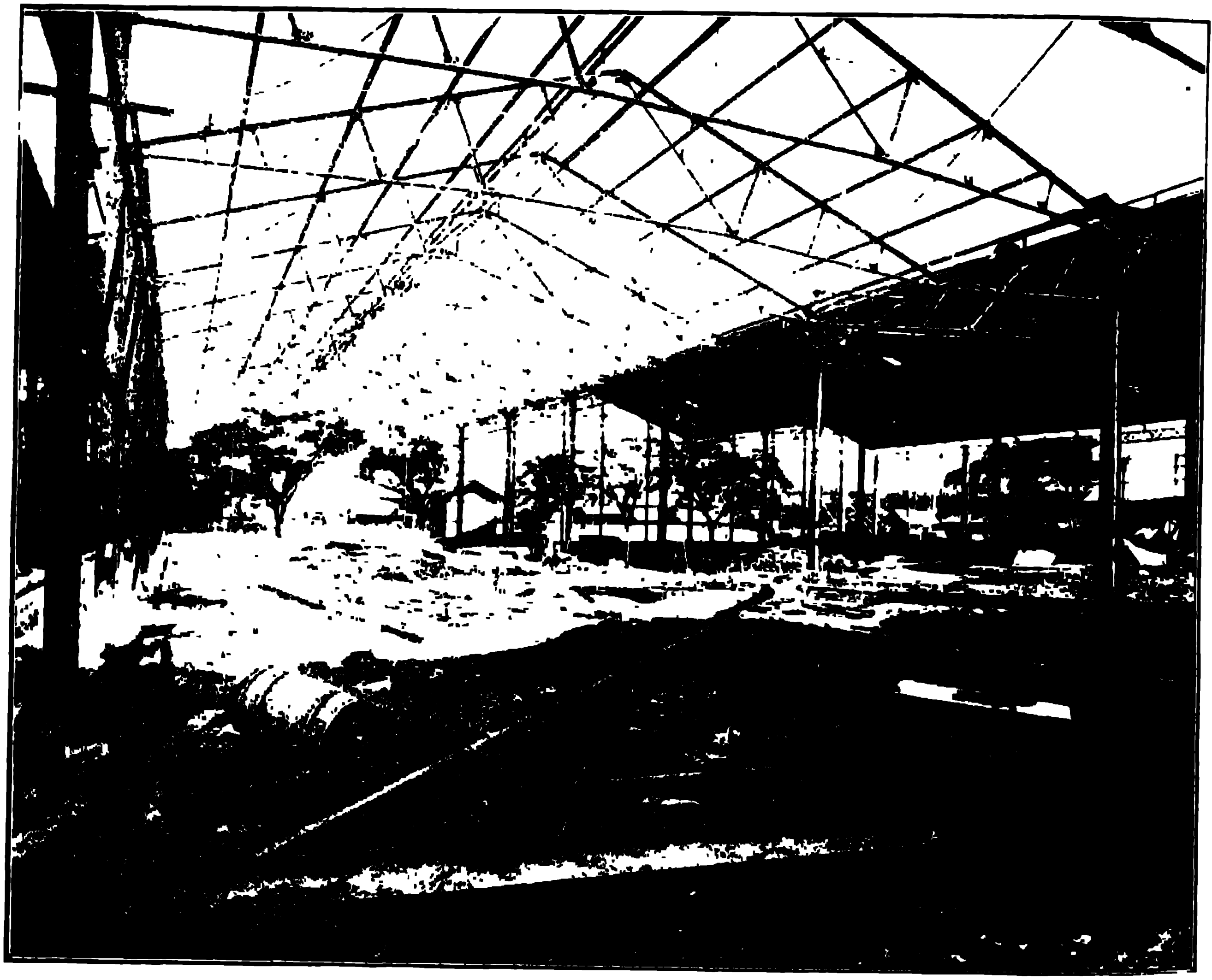
We have had long experience in designing tea garden buildings, and are not only in a position to fabricate and erect factories, but also to equip them completely with plant and accessories.

CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW,

JESSOP & Co. LTD.
ENGINEERS

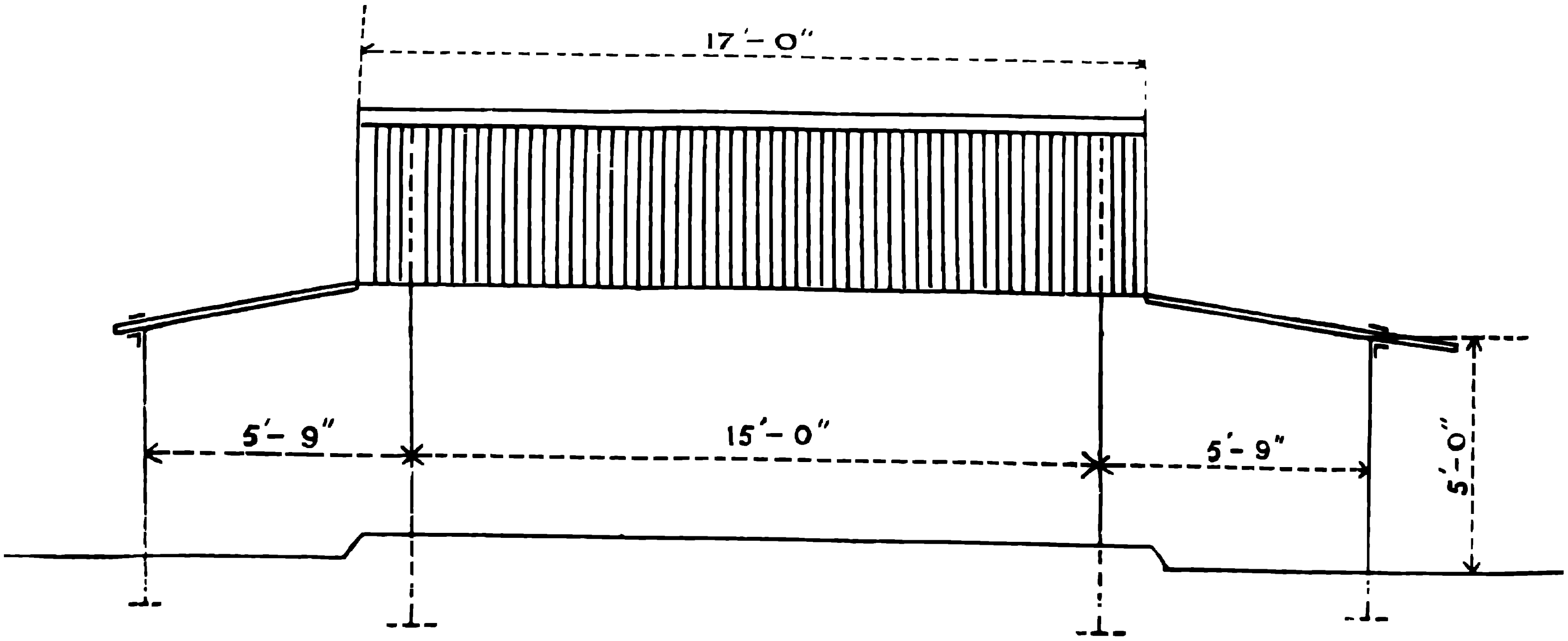
RANGOON, MADRAS,
BOMBAY, LONDON.

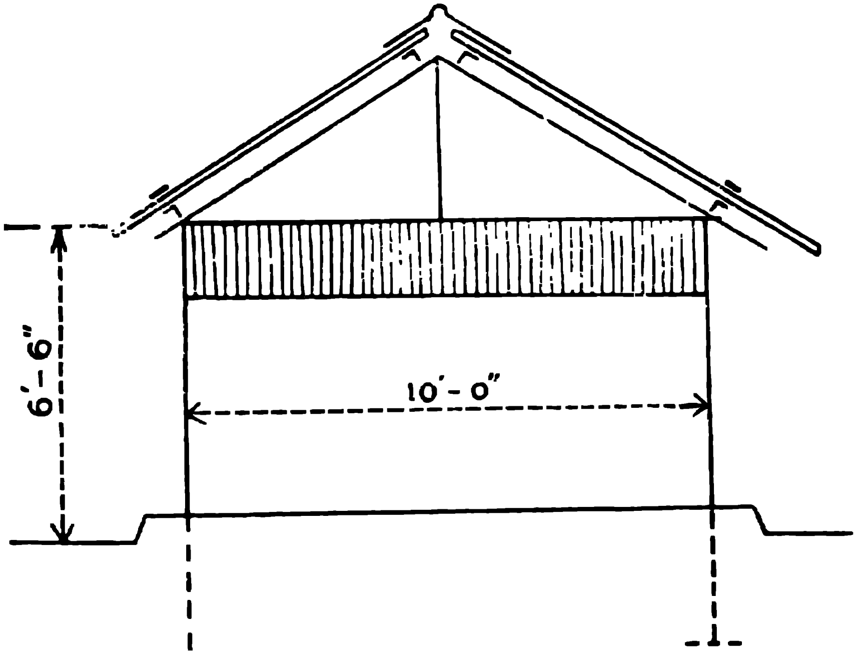
Rice Godowns, Rangoon.



The illustration shows a large Rice Godown recently designed, fabricated and erected by us in Rangoon. The building as shown is in course of erection.

Cooly Houses.





Detached Single Unit with two Verandahs.

We have supplied very large numbers of Cooly Houses o this type and the types shown on the following pages to ou constituents in the Tea Districts.

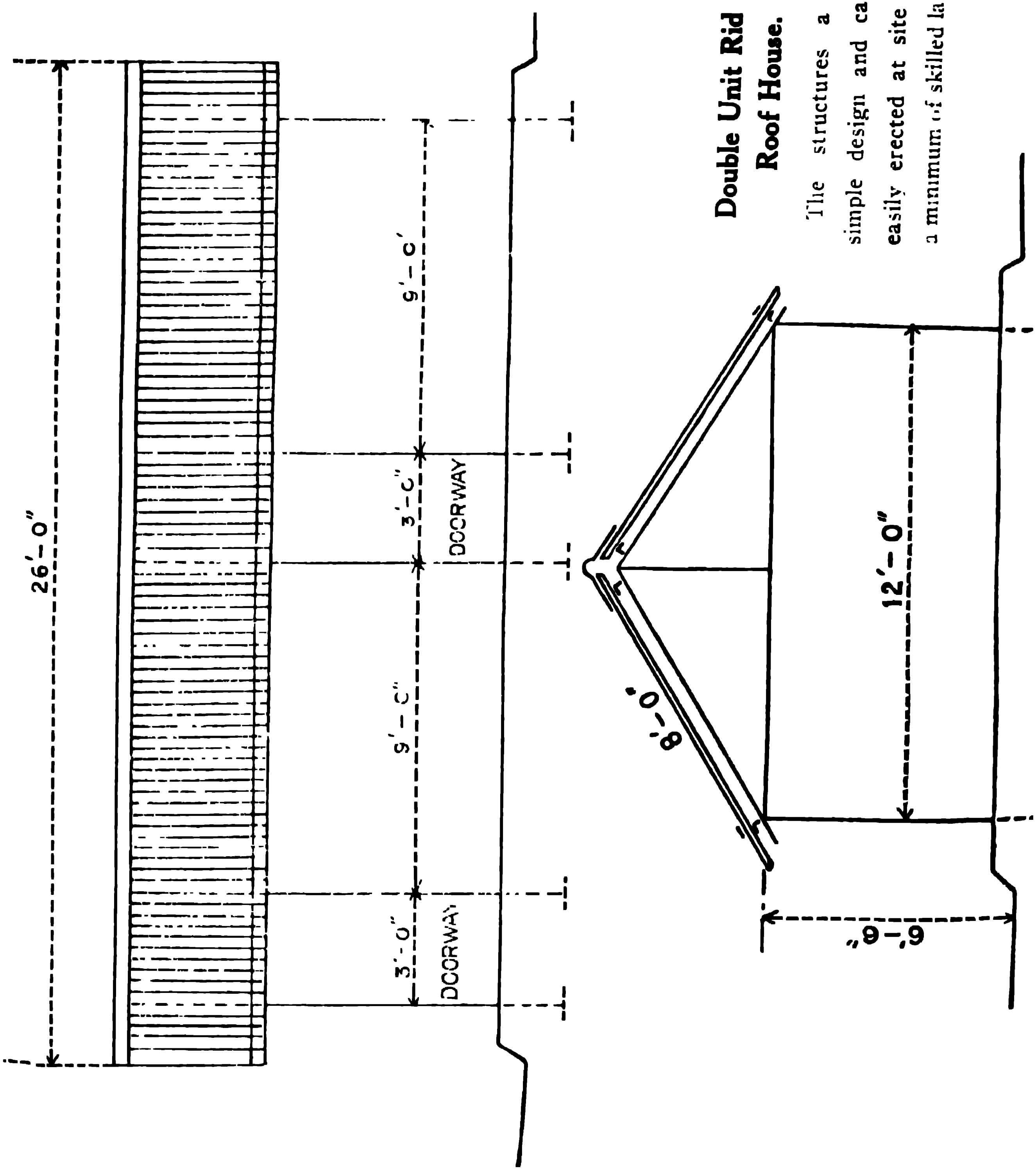
All material is painted and marked for erection.

The structures are of simple design and can be easil erected at site with a minimum of skilled labour.

Cooly Houses.

Double Unit Ridged Roof House.

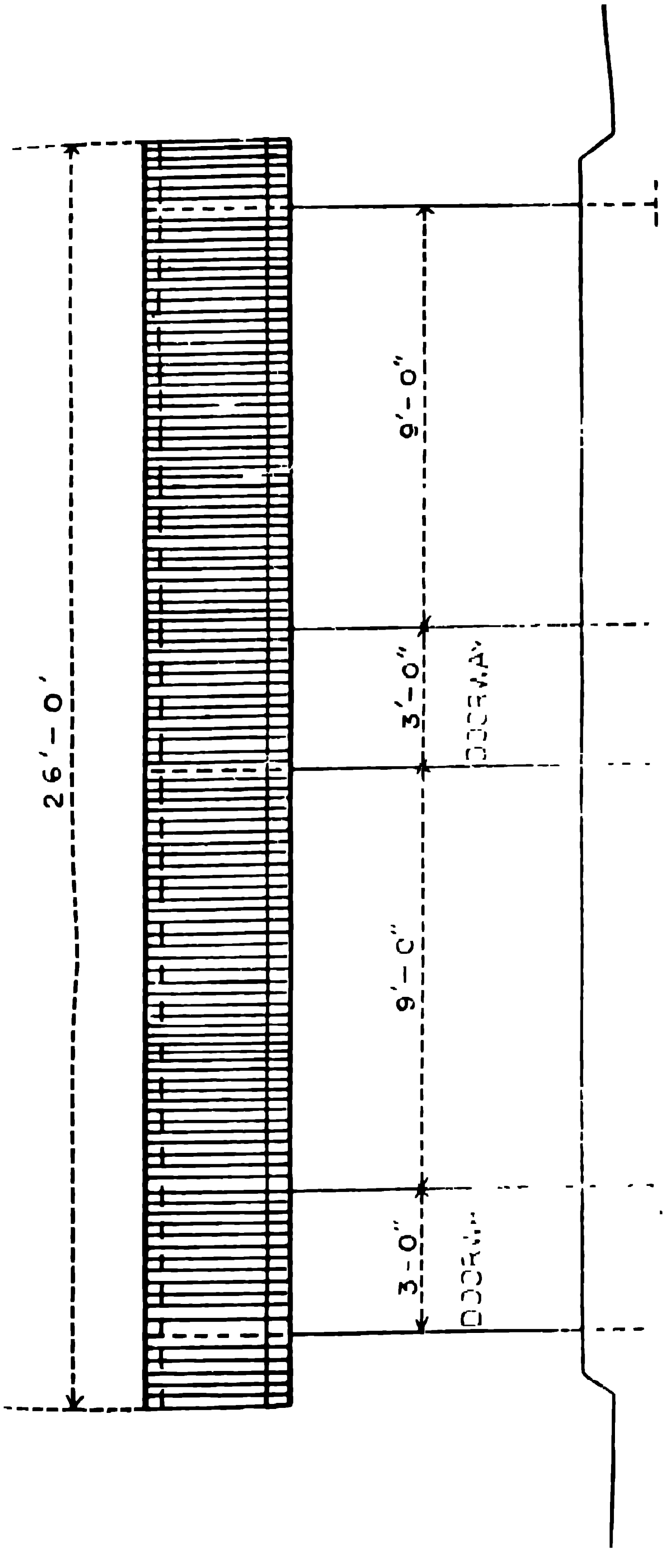
The structures a simple design and can be easily erected at site with a minimum of skilled labour

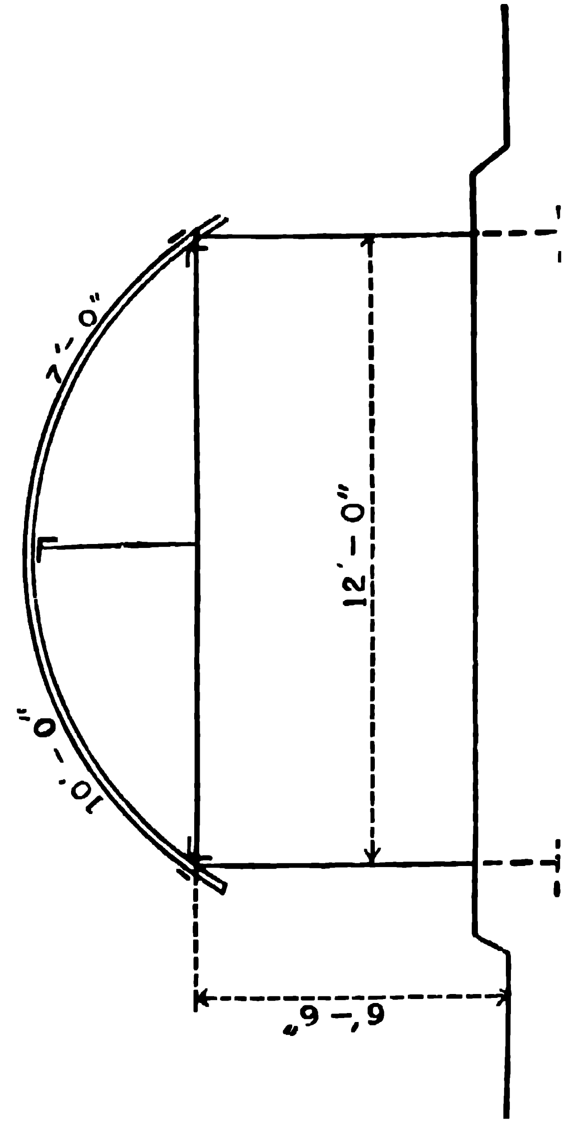


Cooly Houses.

Double Unit Curved Roof Type House.

These structures are of simple design and can be easily erected at site with a minimum of skilled labour.



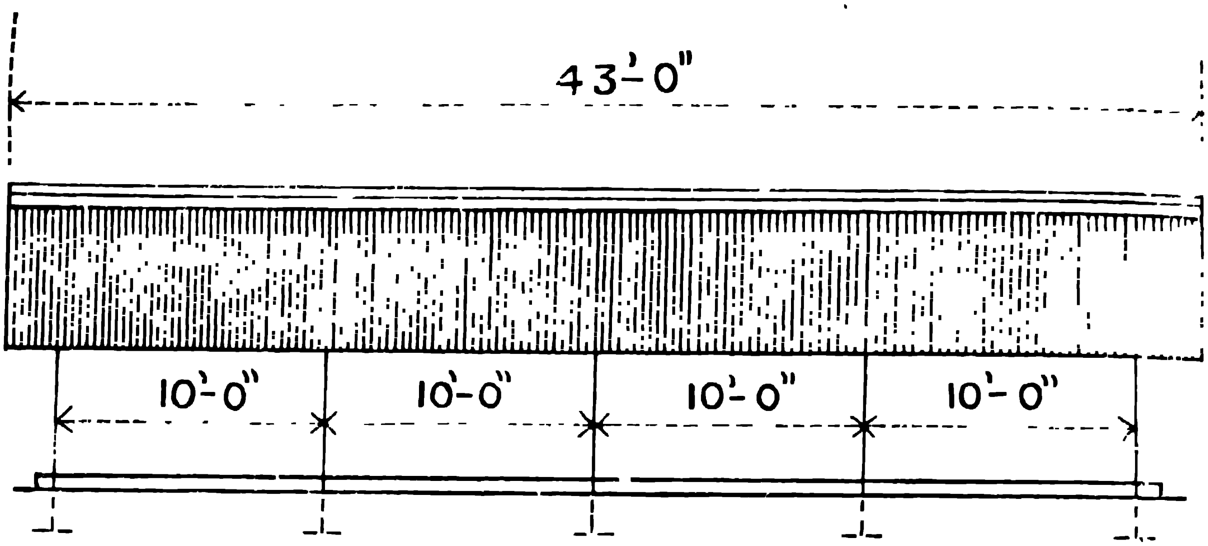


CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

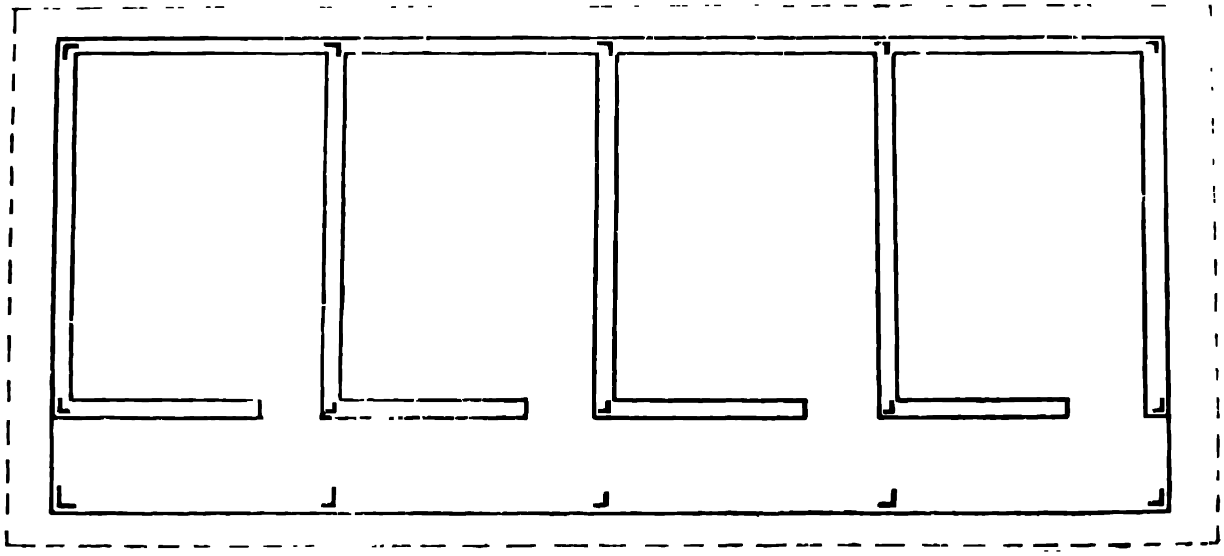
JESSOP & Co. LTD
ENGINEE

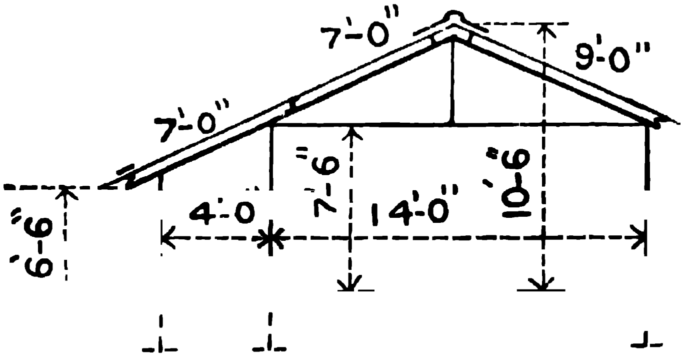
RANGOON, MADRAS
BOMBAY, LONDON

Cooly Houses.



Continuous Verandah Type House. (4 Units.)





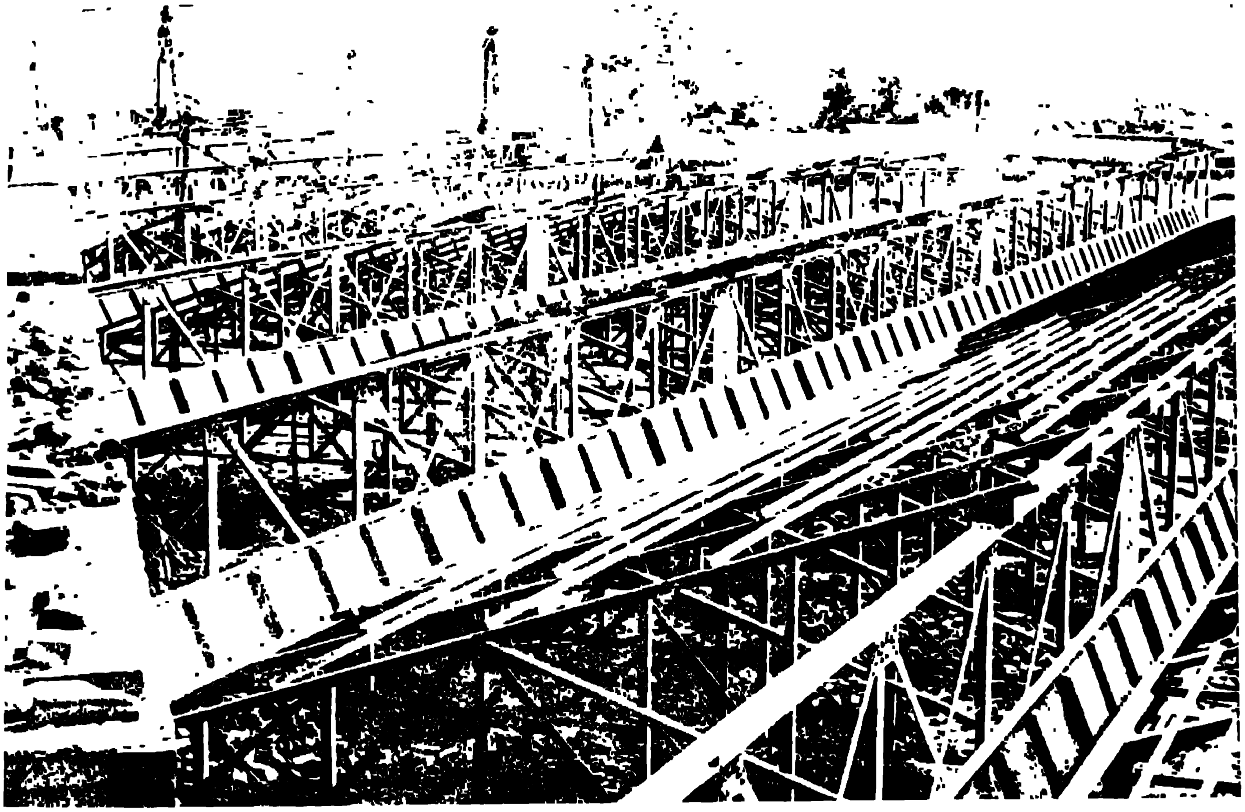
The structures are of simple design and can be easily erected at site with a minimum o' skilled labour.

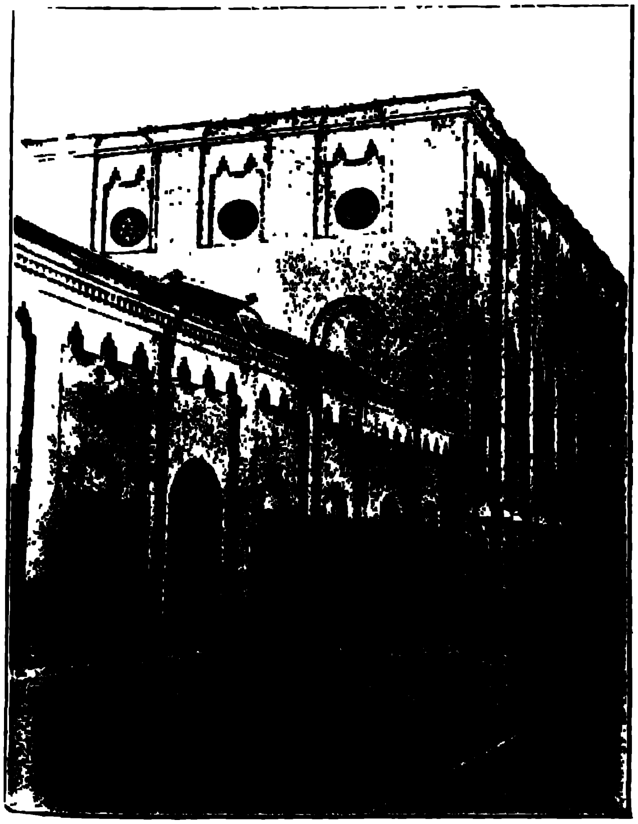
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Jute Mills.





The illustrations are of a local Jute Mill in course of erection, the above being a view of the North Light Roof Steelwork in the Main Mill and the one on the left a view of the Power House.

This is one of the many such Jute Mills which we have designed and constructed. If necessary we undertake the complete design, fabrication, construction and erection of the whole of the buildings, structures and plant required, commencing with an open site, and finishing with a Jute Mill in running order.

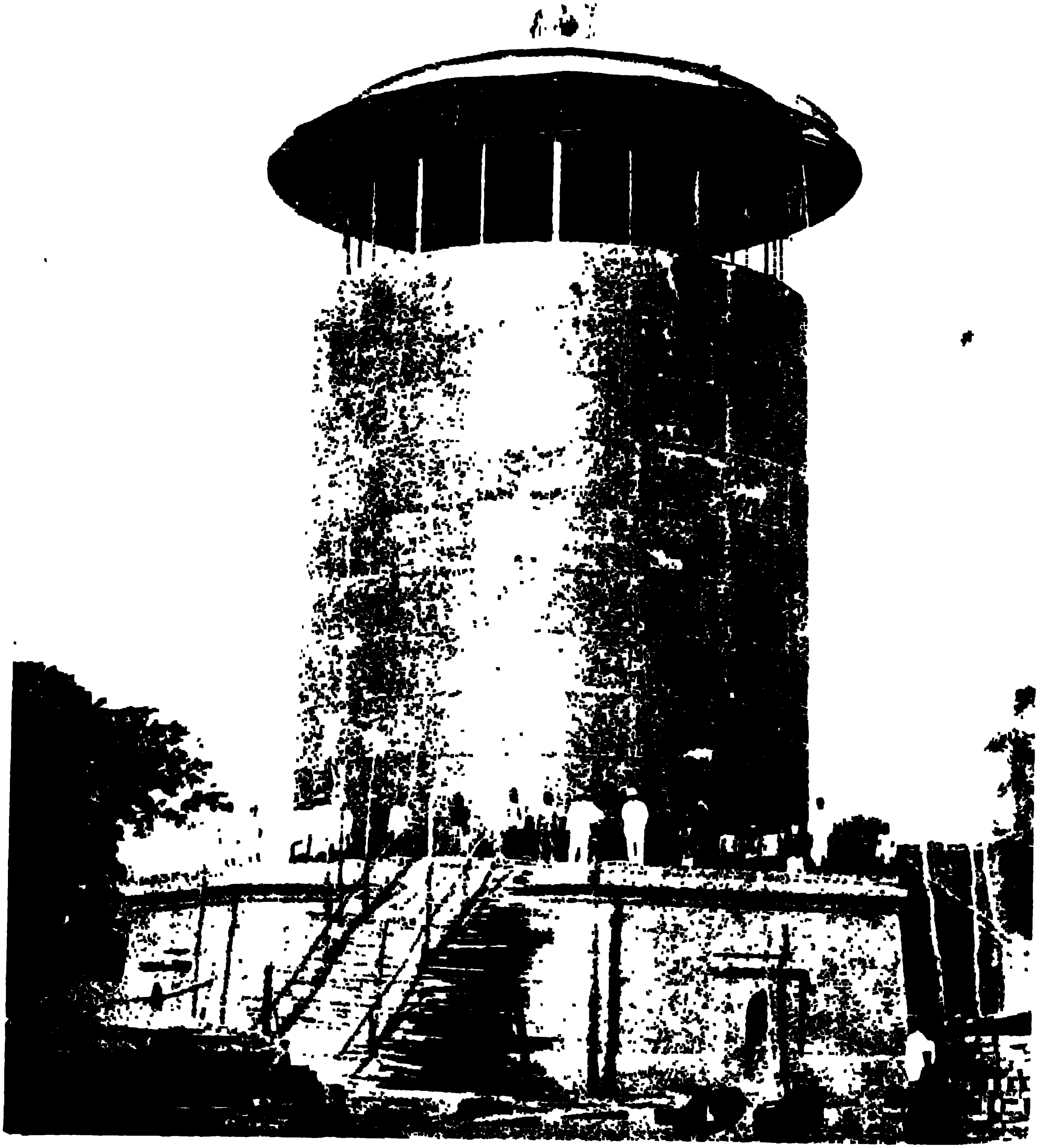
We are also prepared to carry out any such portion of the above work as may be required by our constituents.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON

Steel Water Tank for the Cawnpore Water Works.



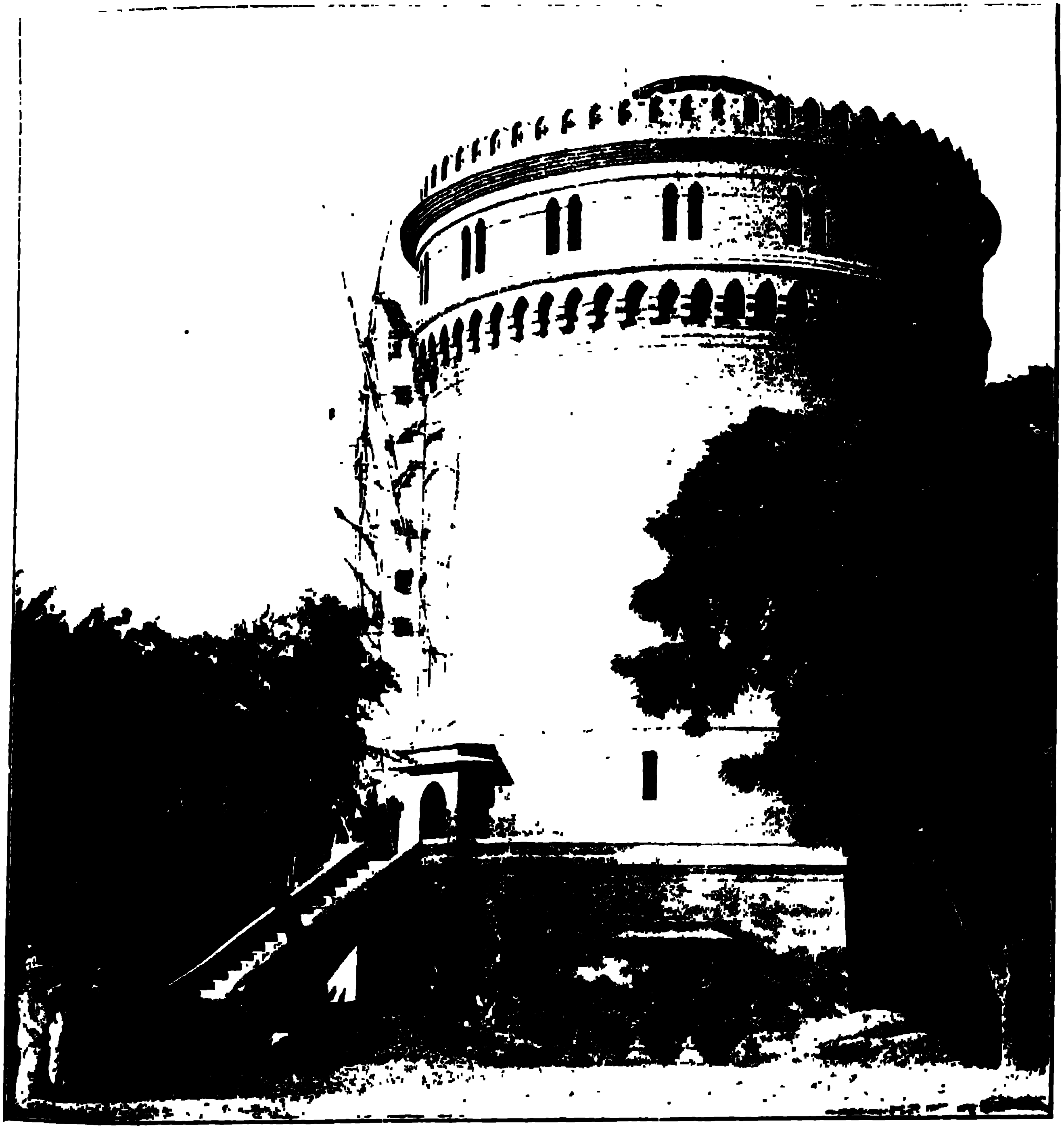
Steel Water Tank in course of construction for the Cawnpore Water Works.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Water Tank for the Cawnpore Water Works.



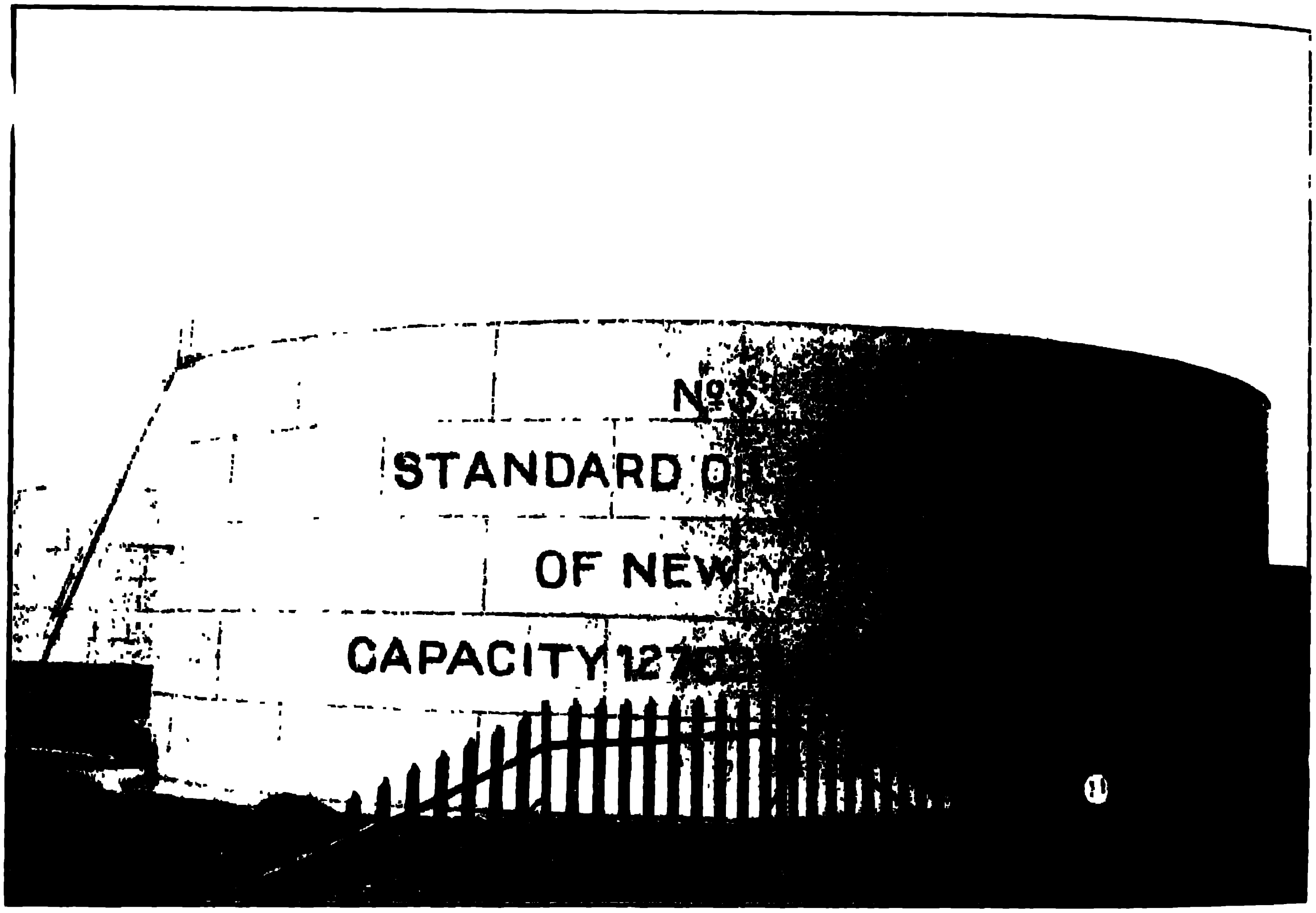
The above illustrates the completed Water Tank built for the Cawnpore Municipality for their new ter Works Scheme. The diameter is 40 feet and the length 50 feet, giving a capacity of almost 400,000 lons. It is covered with a conical steel roof which in its turn supp [illegible] outlook platform at a level 20 feet above the top of the tank. The whole of the steel work is surrounded by a shed of ornamental onry work, also executed by us, the annular space between the steel and the wall being occupied by iral staircase giving access to the roof. The whole of the piping and building work, etc., for the contract is also carried out by us comprising approximately 650 tons of cast iron pipes, two engine houses, two boil[illegible]uses, workshop, venturimeter chambers, etc., etc.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

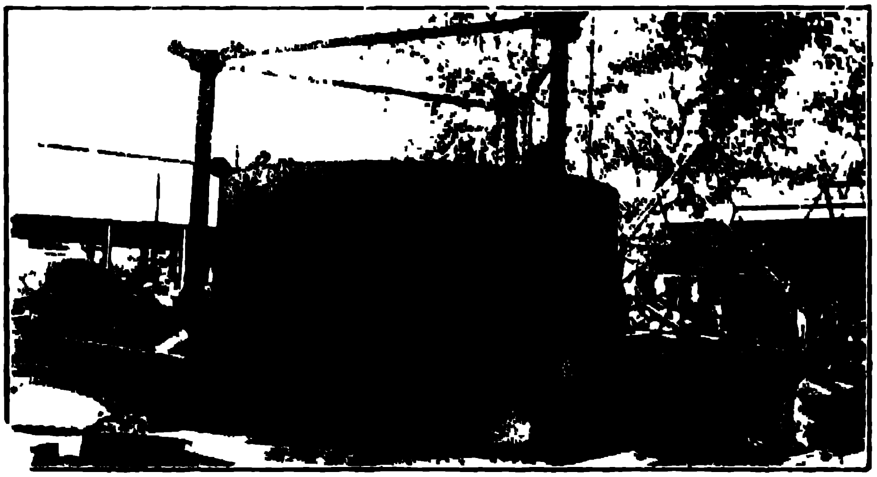
JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Iron and Steel Tanks.



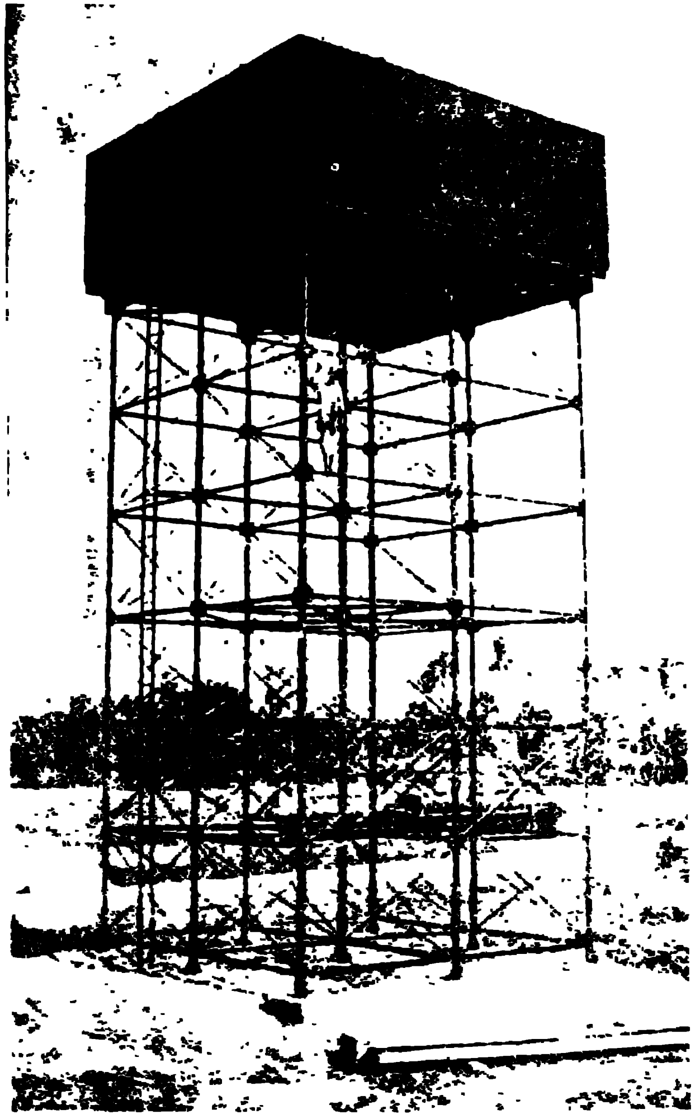
The above illustrates a Steel Tank erected, riveted, and tested by us for the Standard Oil Company at Budge Budge.



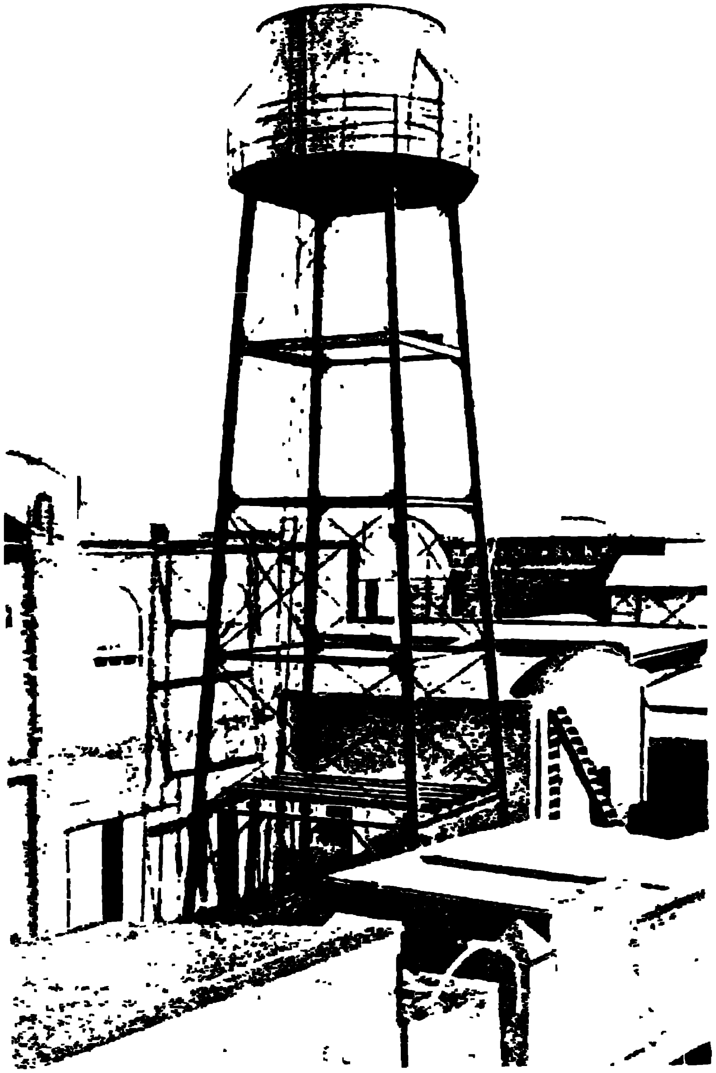
Gas Holder.

We have constructed and erected a number of Gas Holders including those for Ishapore Rifle Factory and the Nawab of Dacca. We shall be pleased to quote for any size of holder or complete plant for making Coal Gas.

ron and Steel Tanks.



25,500-gallon Steel Tank on Steel Staging supplied and erected by us to the order of the Eastern Bengal Railway at Chitpore.



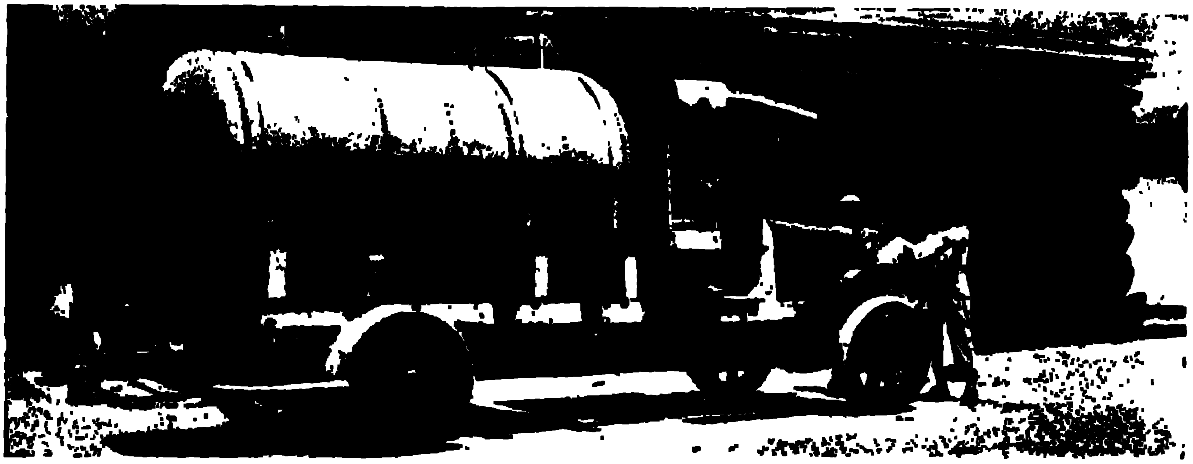
Steel Water Tank on a Steel Trestle 75 feet high. Strength and lightness are special features of these structures. The tower and tank illustrated were designed by us for a Fire Sprinkler Service in a local Jute Press

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Iron and Steel Tanks.



Steel Tank Mounted on a Motor Chassis.

The above is an illustration of a Motor Chassis adapted by us for use by a local Municipality on Road Watering Service. The tank is cylindrical with dished ends, and is fitted with spray pipes and the necessary valves, controlled from the driver's seat.

A Cast-Iron Tank (*during manufacture*).

The resistance to corrosion of Cast-Iron Tanks frequently justifies an extra initial expenditure. We have supplied large numbers of Cast-Iron Tanks to Government Engineers, Railways, etc., and shall be pleased to quote prices and submit designs on receipt of enquiries.

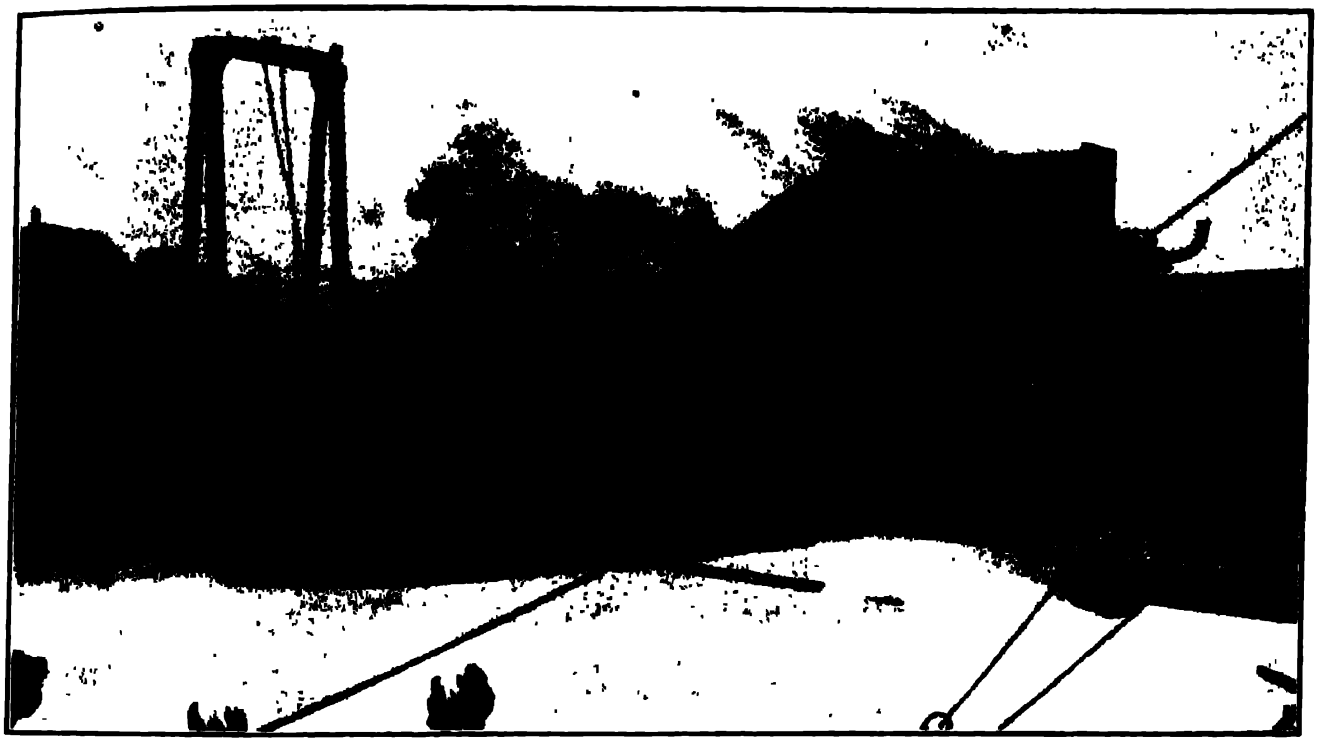
The illustration on the right shows two Cast-Iron Tanks each 3,000 gallons [illegible] roof of the Government Telegraph Office,

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Tolly's Nullah Syphon.



Launching the Syphon weighing over 50 tons across Tolly's Nullah preparatory to lowering into the bed.

This Syphon connects up the drainage systems of Alipore and Kidderpore with the main sewers of Calcutta, and enables the Corporation to utilize 10 miles of sewers built at a cost of 7½ lakhs which were, previous to the construction of the Syphon, lying idle.

We give below two extracts, the first from the "Statesman" of 1st July 1910, and the second from the speech of the Acting Chairman of the Corporation at the opening ceremony.

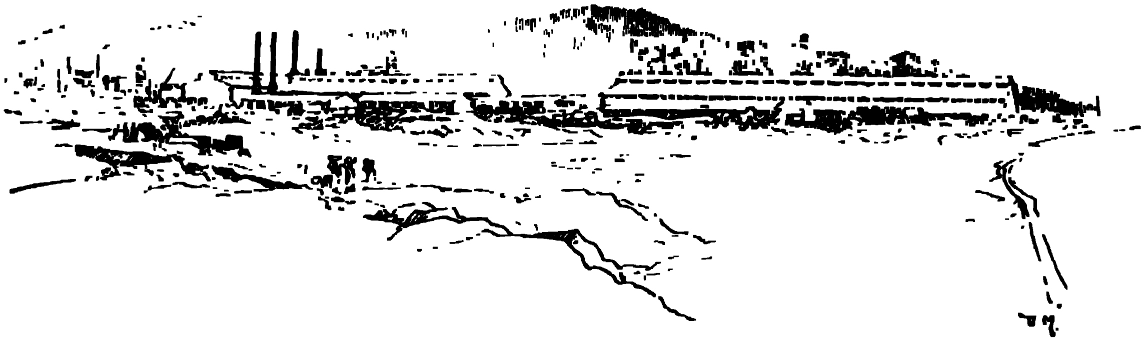
"The success of this operation was due to the excellence of the design, and to the skill, care, and forethought with which the operations were conducted throughout by the contractors . . . . . Work on the Syphon was commenced at the beginning of the cold weather of 1908, and, as has been stated, the Syphon itself was completed in May 1909."

"This is the third attempt which has been made to construct it, the two previous attempts by another firm ending in failure, and this fact shows better than anything else the magnitude of the engineering difficulties which have been successfully overcome by Jessop & Co."

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD** **ENGINEERS** **RANGOON, MADRAS, BOMBAY, LONDON.**

Our Jamshedpur Works.

In 1917, when the War had entered a new phase, and it was apparent that the end was far from sight, the Government of India was faced with many extraordinary and unique industrial difficulties. Not least of these was a shortage of tonnage, due partly to the enemies' submarine campaign, but chiefly owing to the heavy demands made on Eastern shipping for the transport of troops and stores to Mesopotamia. Great Britain was not in a position to make good the shortage, and as there was not, at the time in India, a Steelworks capable of rolling ships' plates, it appeared that there was no solution to the problem and that India would eventually be starved out in this respect.



Sketch of Plate Mill.

The Government of India, after much serious consideration, approached the Tata Iron and Steel Company, at that time the only producers of steel in the country, with regard to the possibility of rolling steel plates. To enable the Tata Company to meet the Government's wishes meant putting down large extensions to their works, and the upshot of this suggestion was that the contract for the fabrication and erection of extensions at Jamshedpur, **including the first Plate Mill to be erected in India,** was placed with Jessop and Company. The total weight of steelwork to be erected was approximately **15,000 tons.** To carry out this work it was decided to remove the Structural portion of our works at Howrah to Jamshedpur in order to avoid delays and difficulties with transport.

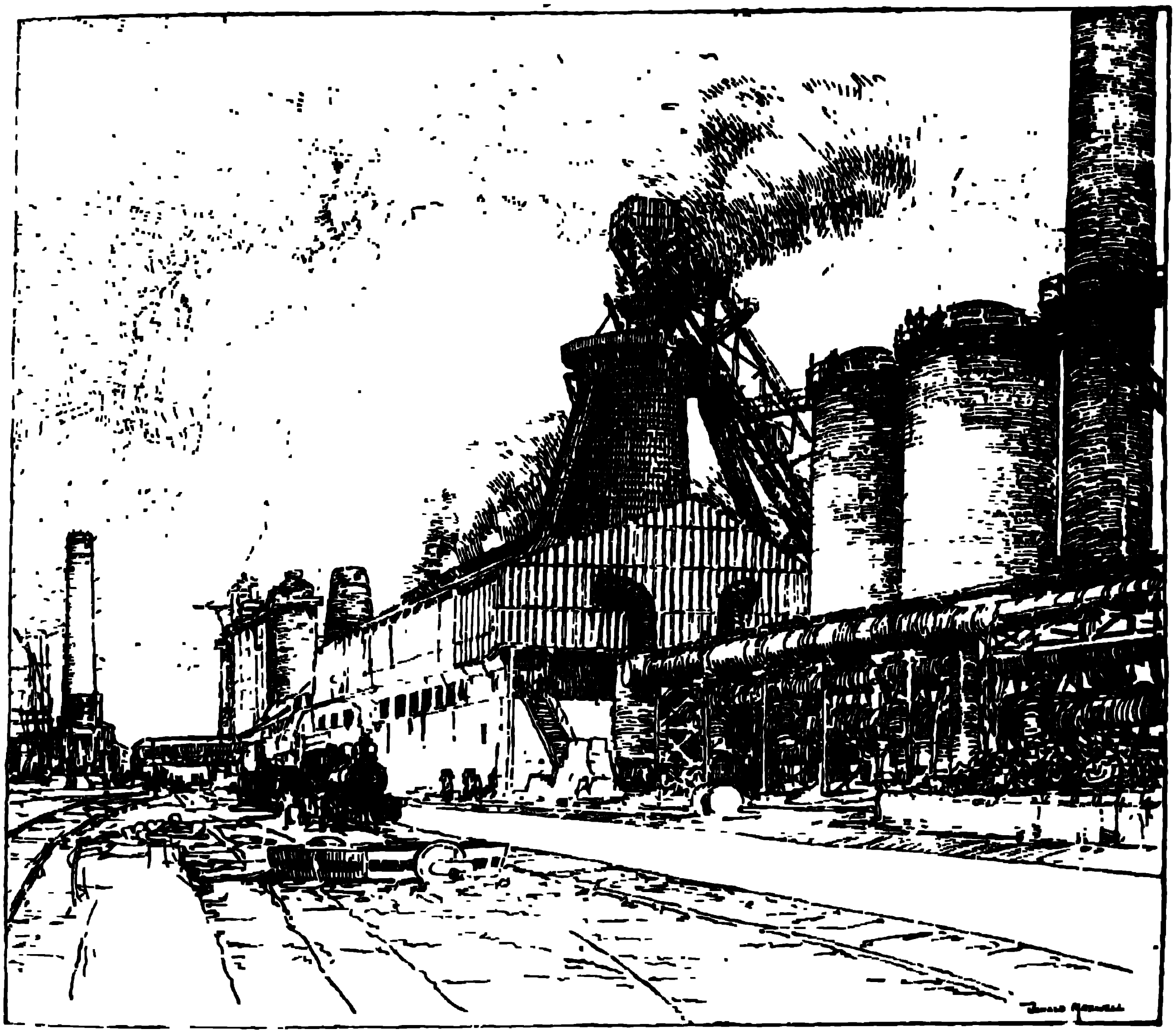
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Blast Furnace and Stoves.

Erected by our Jamshedpur Works.



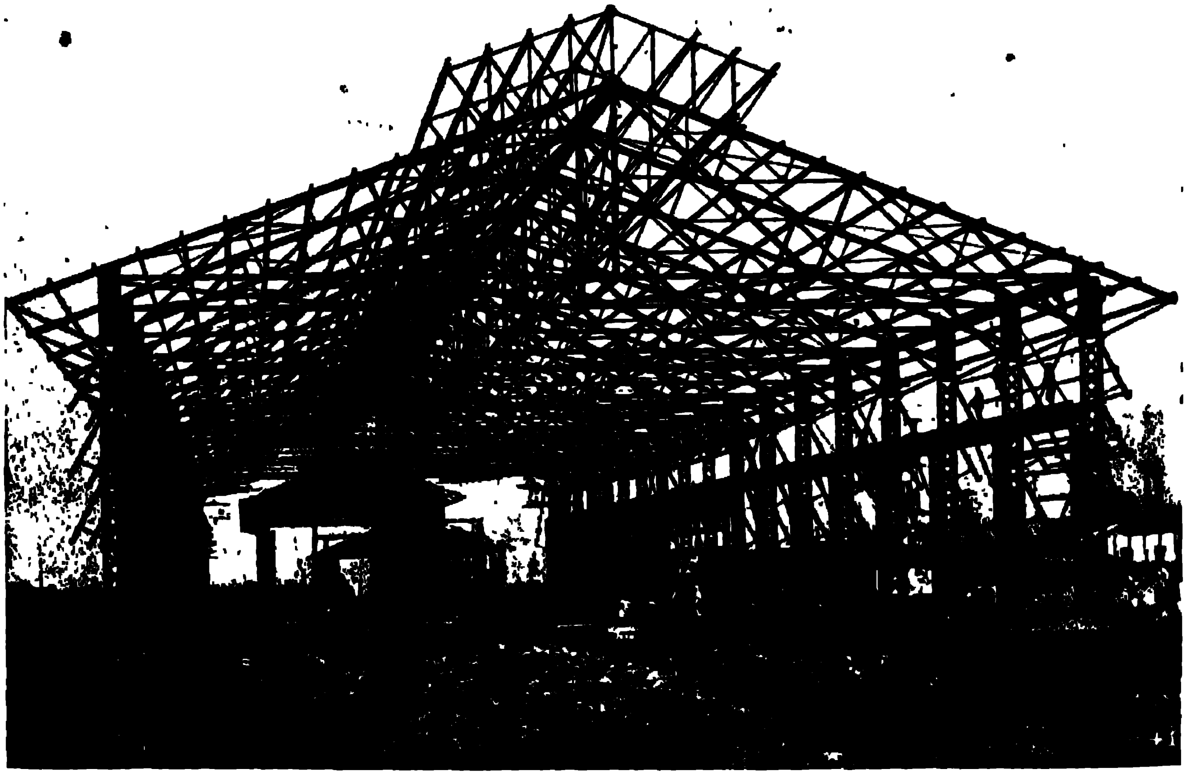
Sketch of a Blast Furnace and Stoves.

The no mean undertaking of dismantling at Howrah and re-erecting at Jamshedpur was carried through without a hitch. Up to nearly the end of 1917 our works were running at Howrah, and in July of the next year these same works were running at Jamshedpur. Various improvements and additions were made to our plant to improve the efficiency and give greater output. Our capabilities were thereby increased to **1,000 tons of fabricated steel per month.**

Steel Works and Rolling Mills.

Erected by our Jamshedpur Works.

The sketches and illustrations give some idea of the class of work we have undertaken



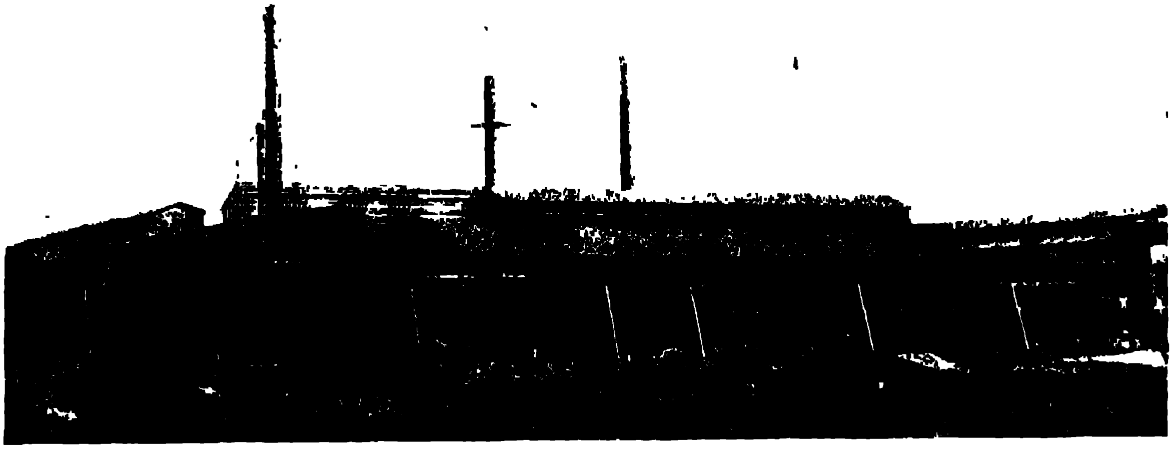
Framework of Plate Mill Buildings.

The Plate Mill appears in the sketch on page 338, and the illustrations on this and on page 342 show the range of structures at different periods during the erection.

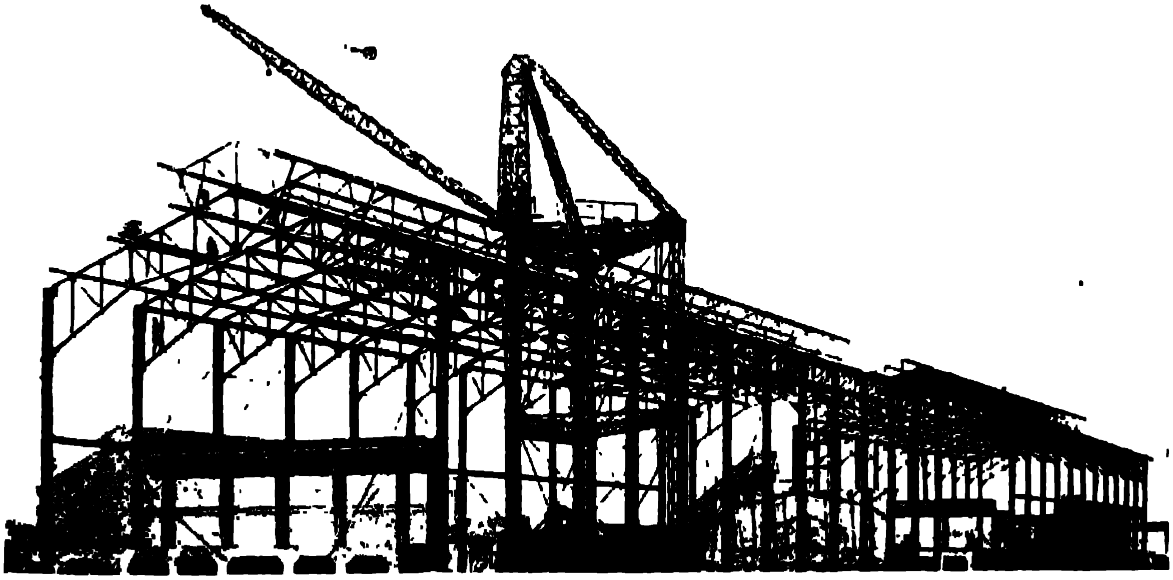
The total weight of steelwork was over **3,500 tons.**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD** ENGINEERS RANGOON, MADRAS, BOMBAY, LONDON.

Steel Works and Rolling Mills.



Reheating Furnace Building.



Bye-Product Building.

In addition to structural work at Jamshedpur we manufactured at our Howrah Works over **1,500 tons** of castings for the New Coke Ovens, some of the individual castings weighing up to **15 tons.**

The whole work comprises an engineering achievement unexampled in India, and it shows the abundance of enterprise available, provided the opportunity is forthcoming through the fostering of local industries.

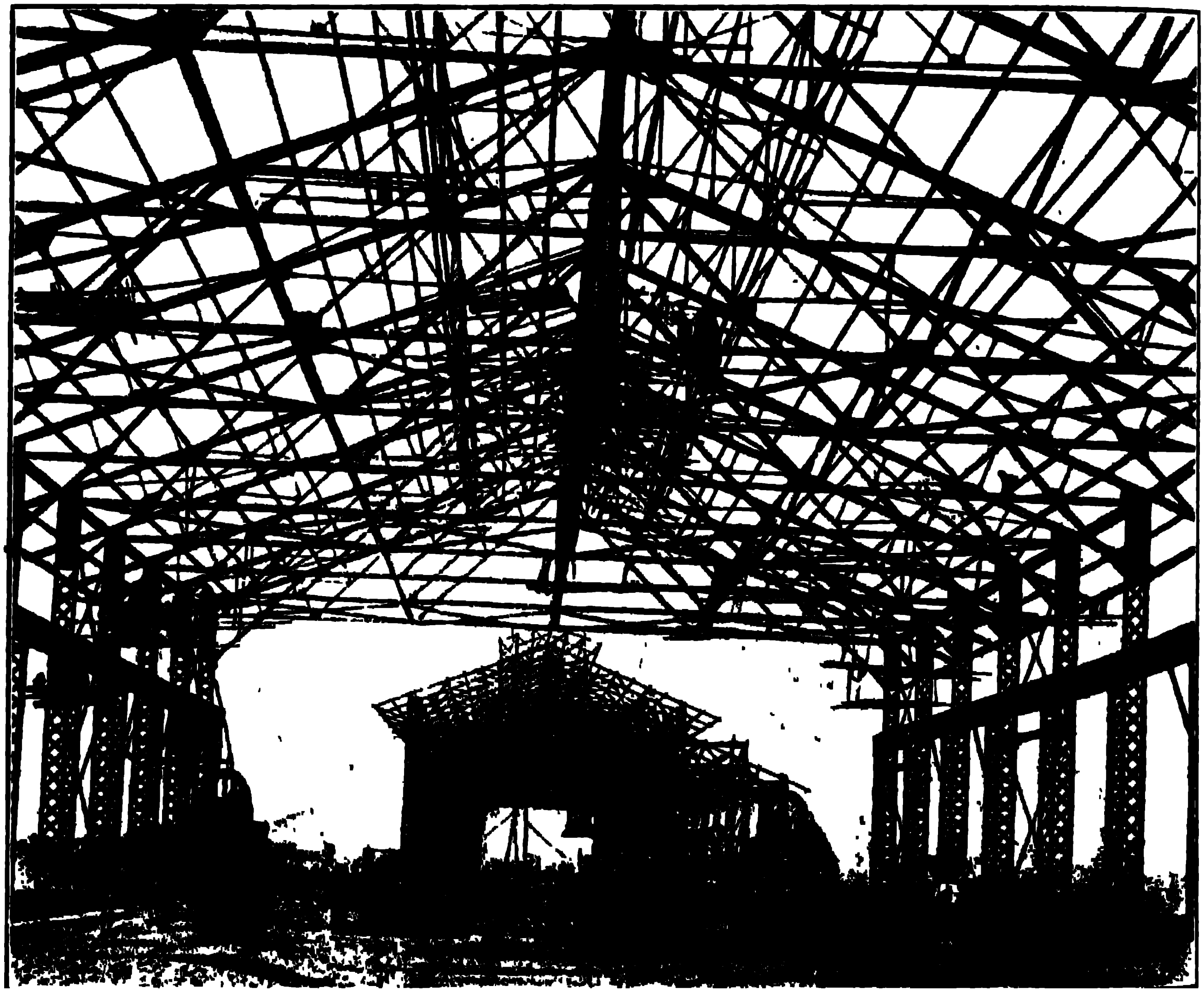
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Works,

Jamshedpur.



This view shows interior of Shear building, New Plate Mill, looking towards Conveyor building and Mill building, all in course of erection by us.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Works,

Jamshedpur.

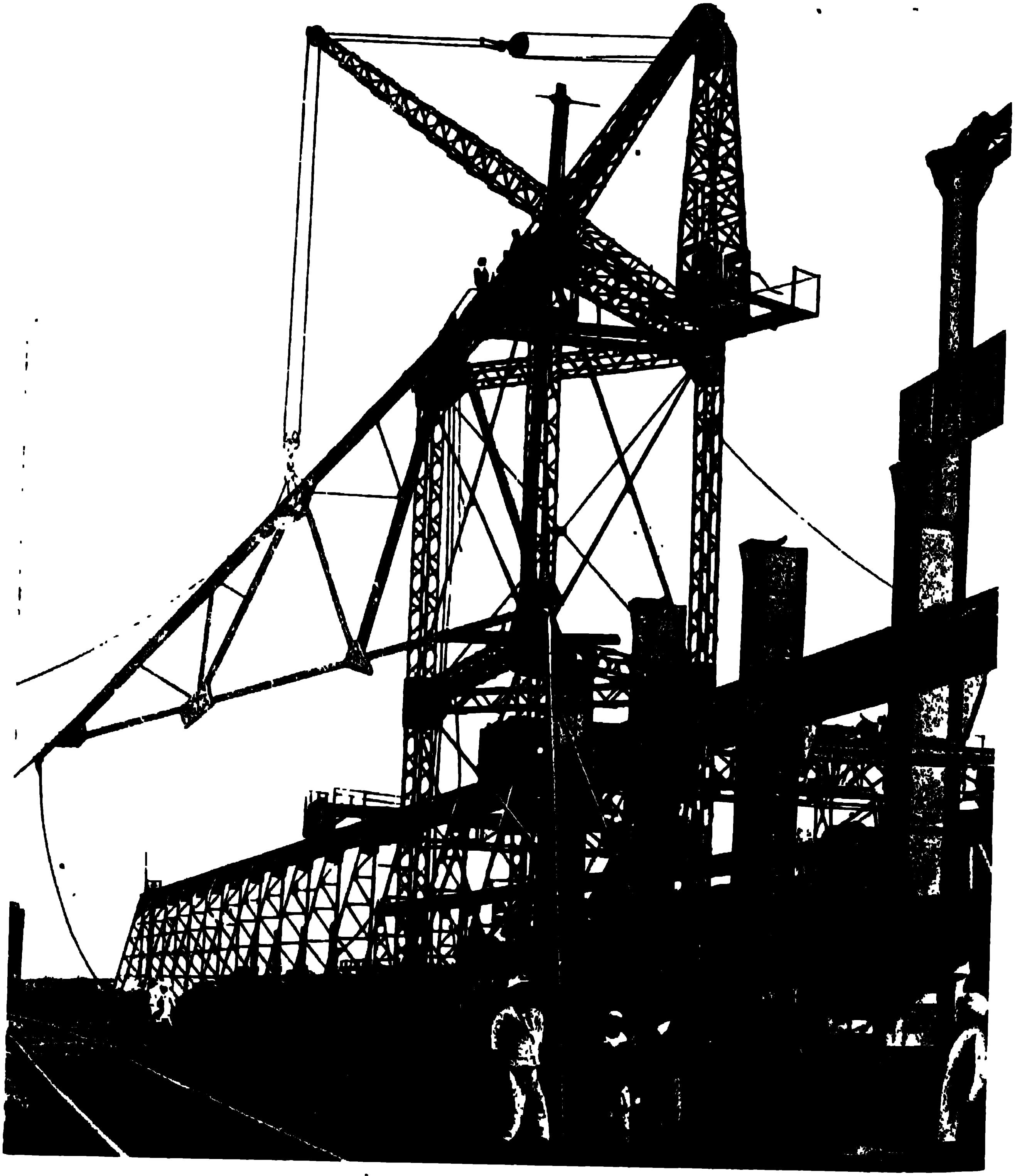
West end view of New Plate Mill building showing Mill building in centre and Motor House on left.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Works, Jamshedpur.



The above photograph shows our erecting crane hoisting into position one of the half-trusses for the Open-hearth building extension.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON.

Steel Works,

Jamshedpur.

This view shows extension to existing Open-hearth building for the Tata Iron and Steel Company.

The extension is 120 ft. long by 135 ft. total span covering one 60 ft. bay, and one 75 ft. bay. The height to ridge of monitor roof is 101 ft.

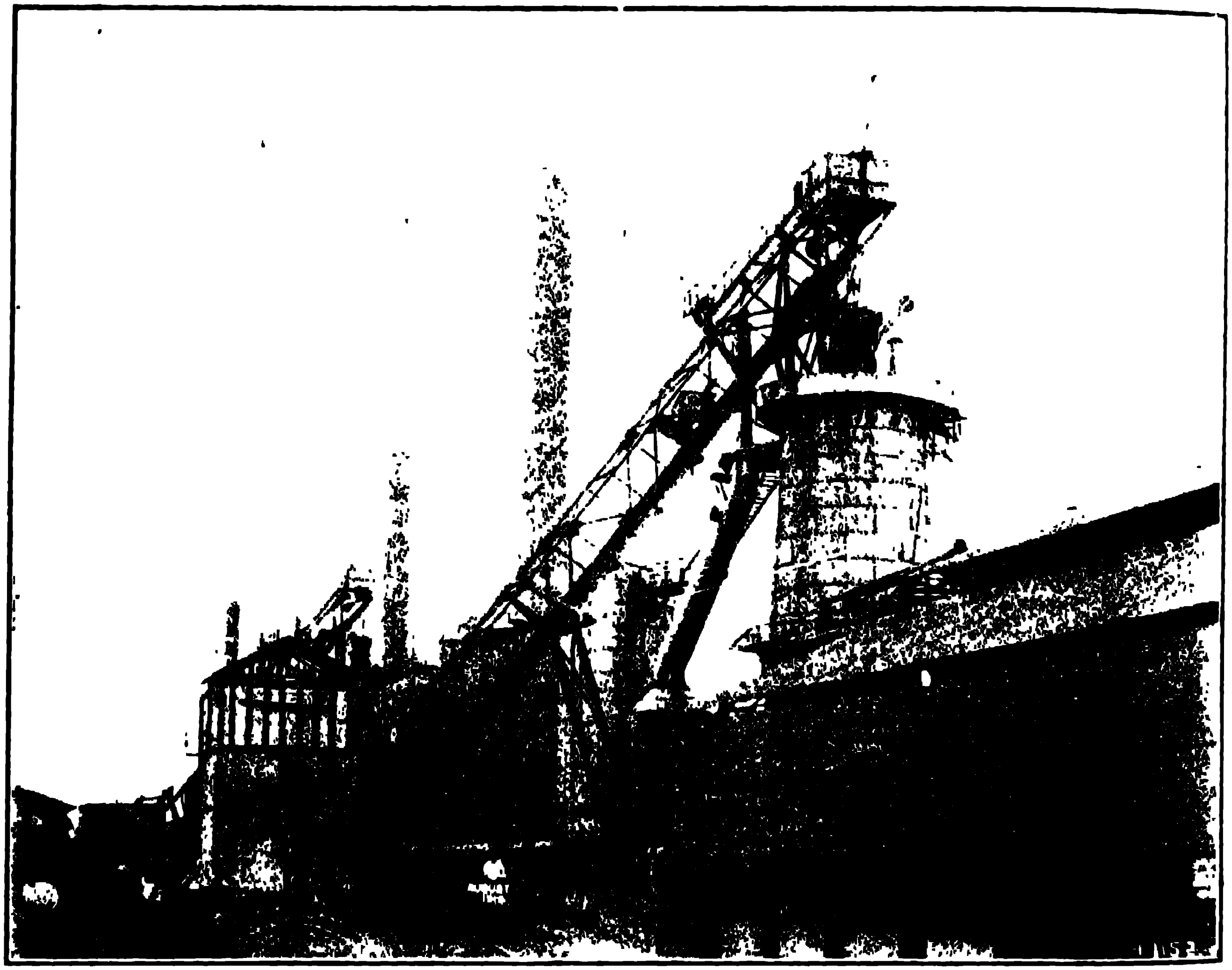
Total weight of steelwork is 390 tons, all fabricated and erected by us from Tata Steel, to their designs.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

ESSOP & Co. Ltd
ENGINEERS

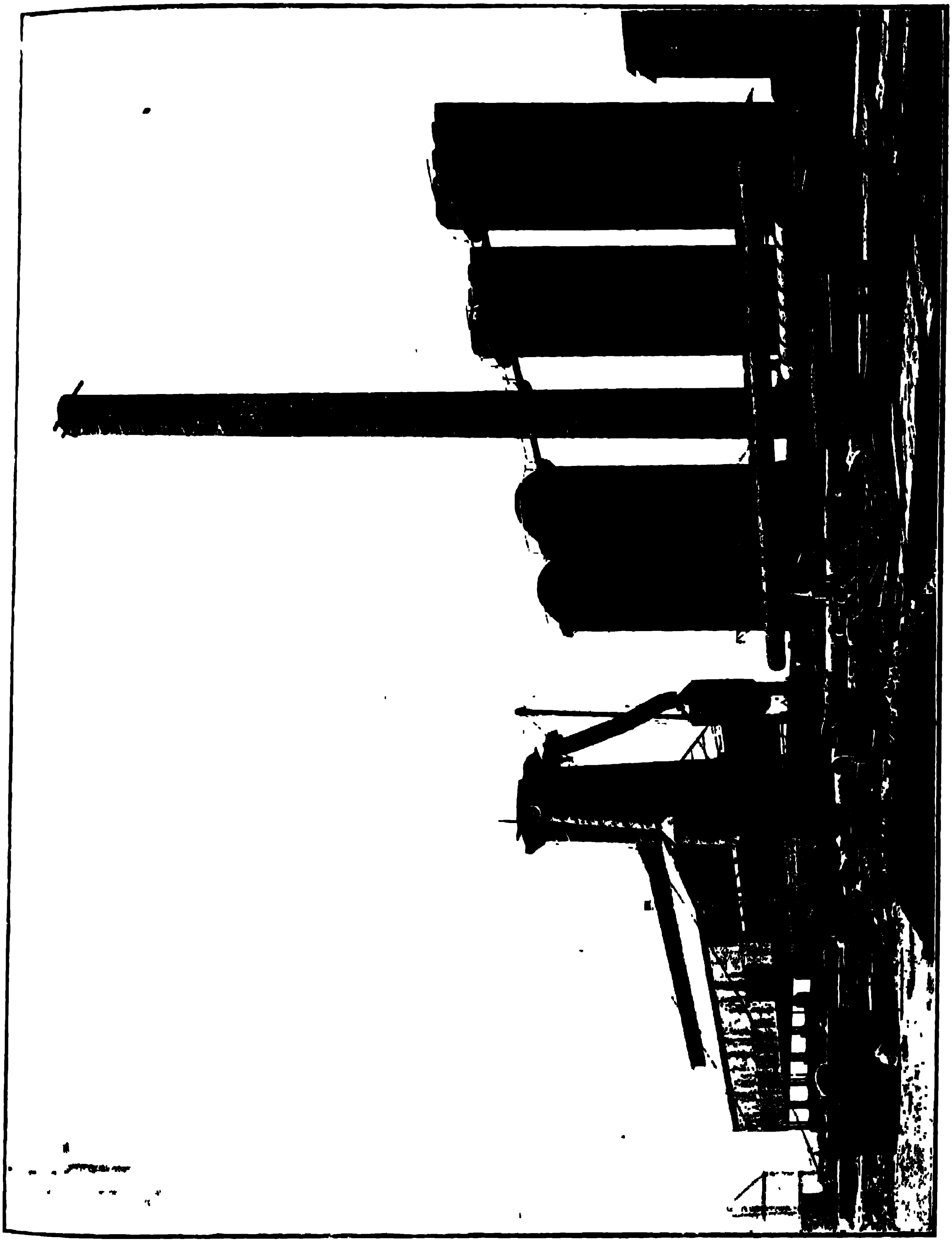
RANGOON, MADRAS,
BOMBAY, LONDON.

Blast Furnace, Jāmshedpur.



This view shows a Blast Furnace, with four Stove Shells, draught stock, dust catchers, down comers, gas and air mains, and Cast House all erected complete by us for the Tata Iron and Steel Company. Total weight of iron and steelwork 1,000 tons.

This view also shows the Skip-Bridge and the top of the stock bins, total weight 469 tons, fabricated and erected by us from Tata Steel, to their designs.



Blast Furnace and Stoves also 200'-0" Stack for Tata Iron and Steel Co., Jamshedpur.

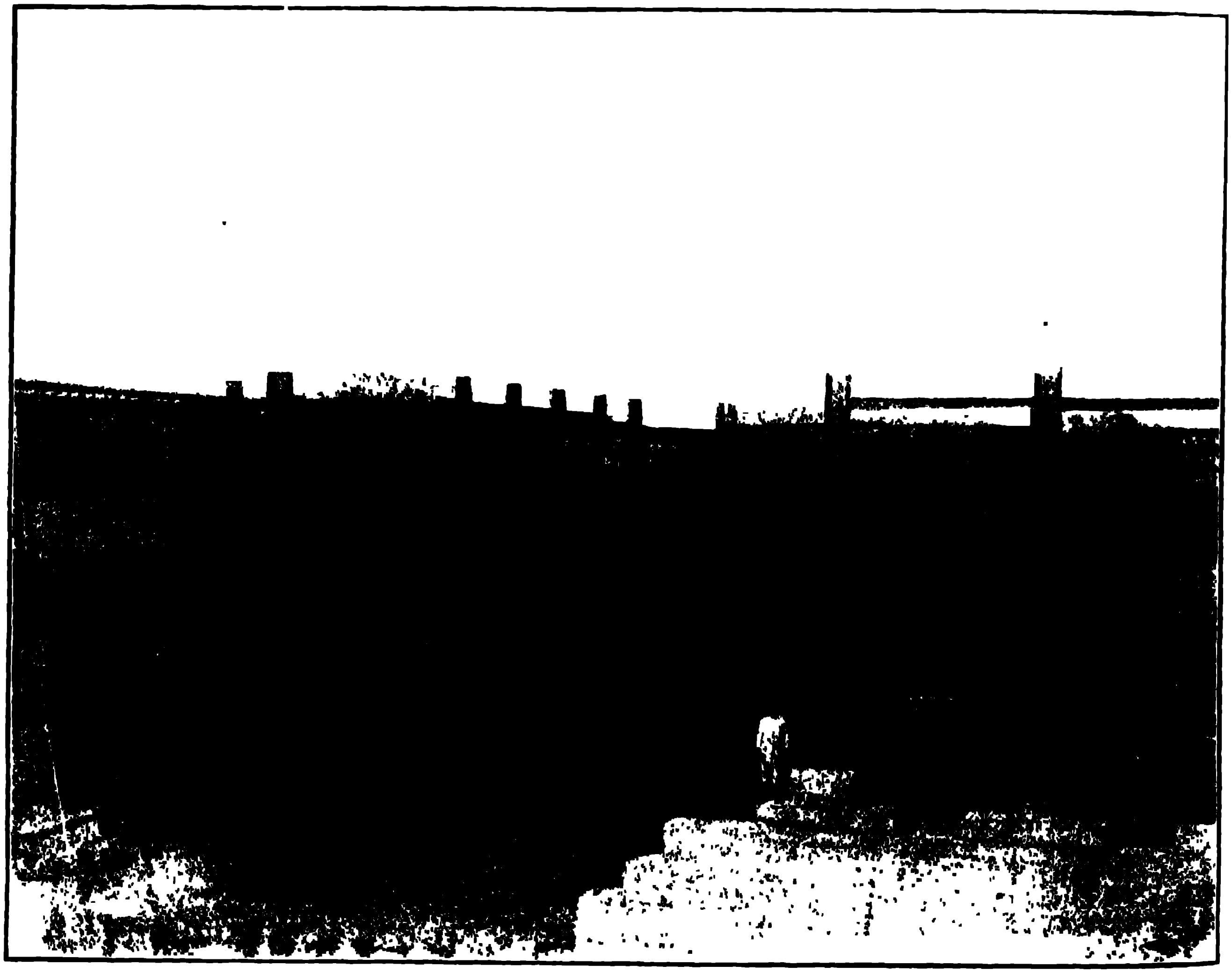
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

General Offices,

Jamshedpur.



New General Office for the Tata Iron and Steel Company, consisting of two floors with basement.

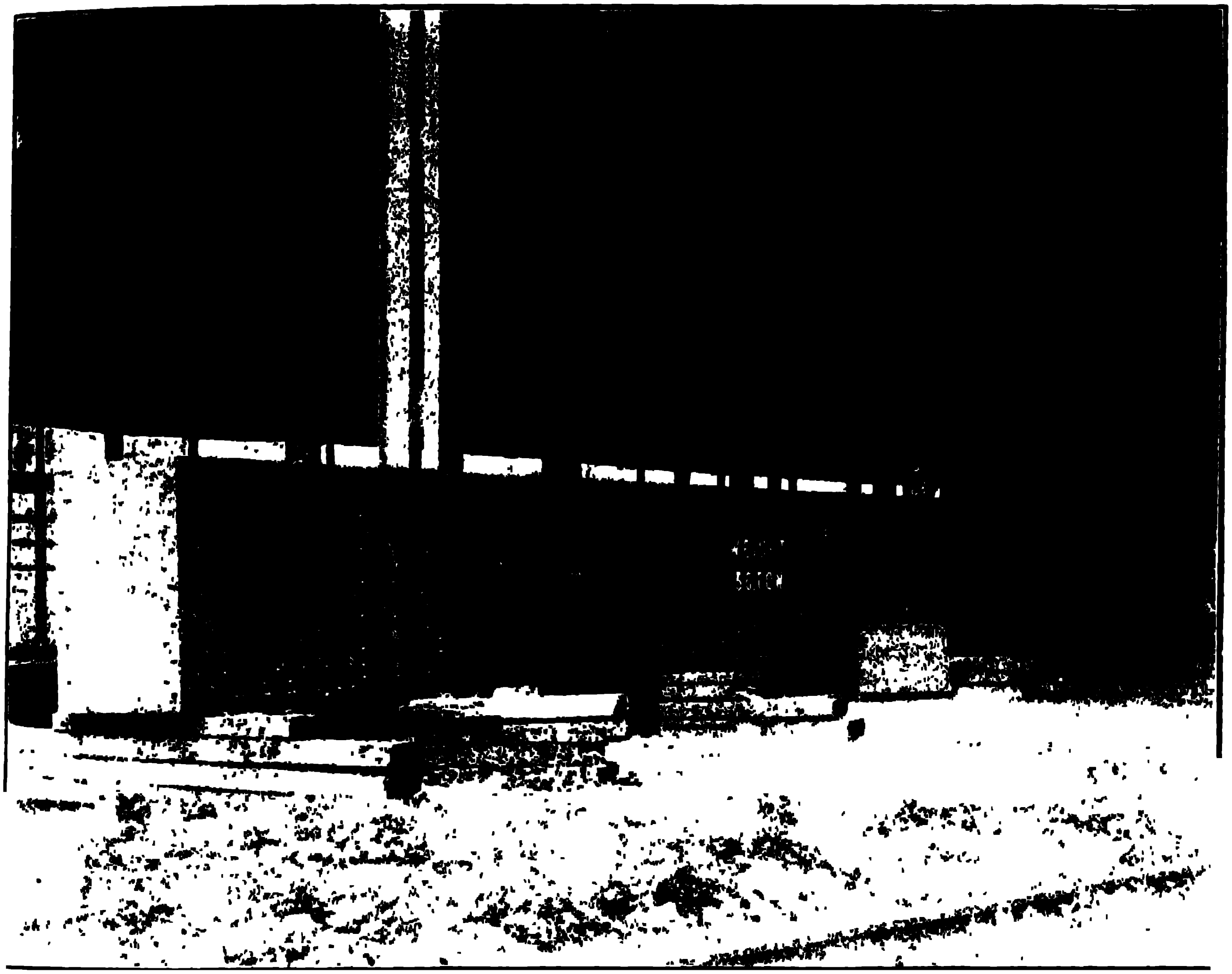
Total weight of steelwork 983 tons, fabricated and erected by us from Tata Steel, to their designs.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Miscellaneous Steelwork, Jamshedpur.



Centre Box Girder for No. 2 Open-hearth Tilting Furnace for the Tata Iron and Steel Company.

Overall	Length	.. 53 feet ½ inch.
„	Height	.. 4 „ 7½ inches.
„	Width	.. 3 „

Web Plates ¾" thick. Flange Plates 1¾" thick.

Weight 30 Tons.

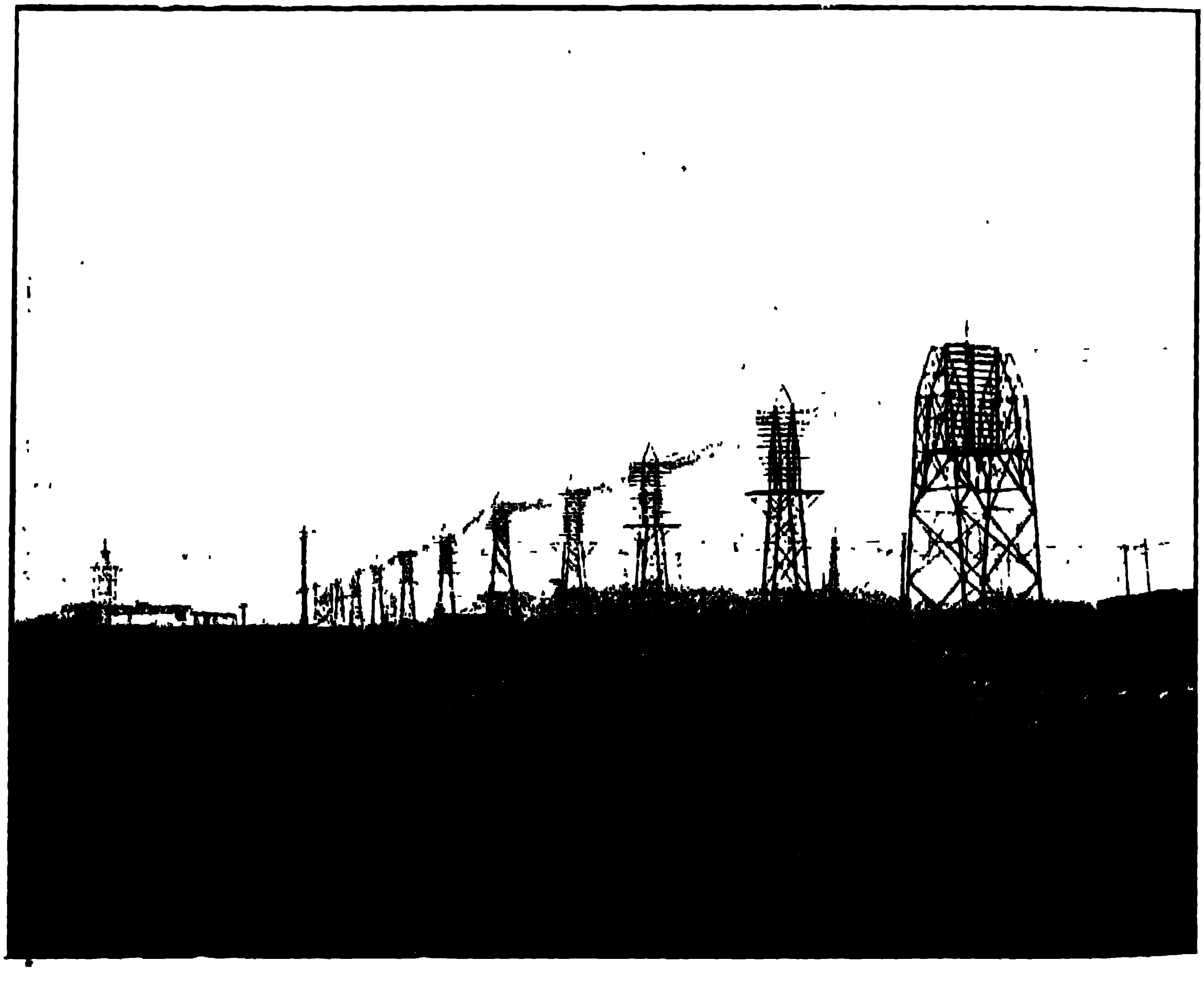
The above is one of the varied pieces of structural work carried out by us at Jamshedpur.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Cable Towers,
Jamshedpur.



Amongst the almost endless variety of structures called for from us in the extension of the Tata Iron and Steel Company's plant, the above forms an interesting item.

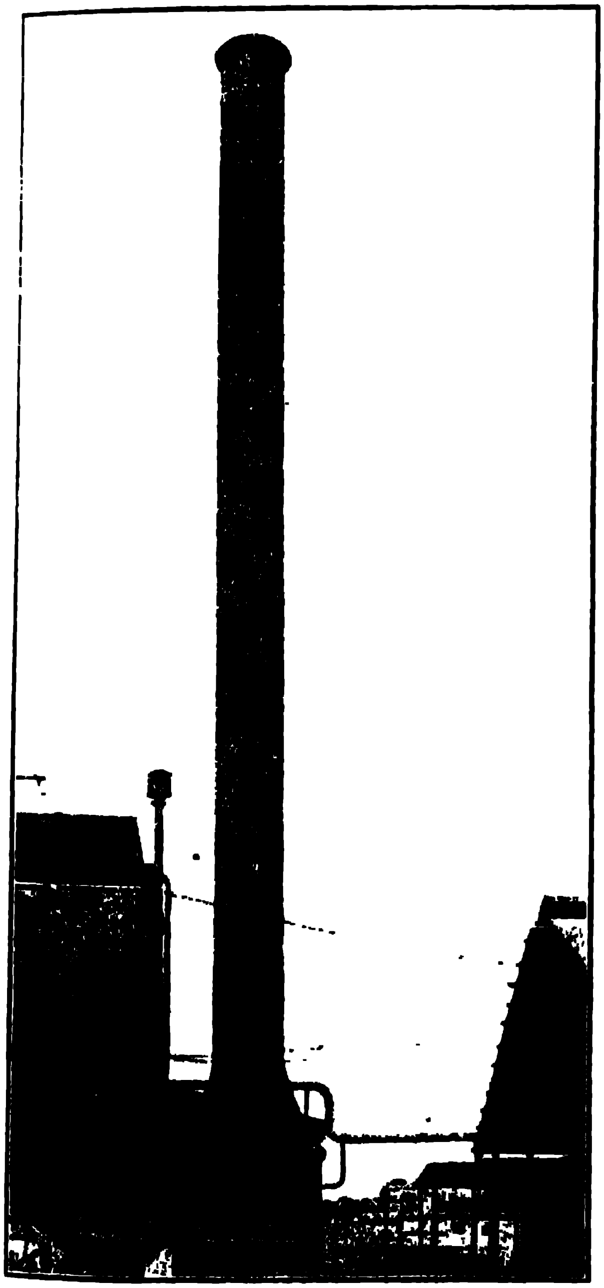
The Towers in this line are unusually massive, carrying as they do some 90 power cables.

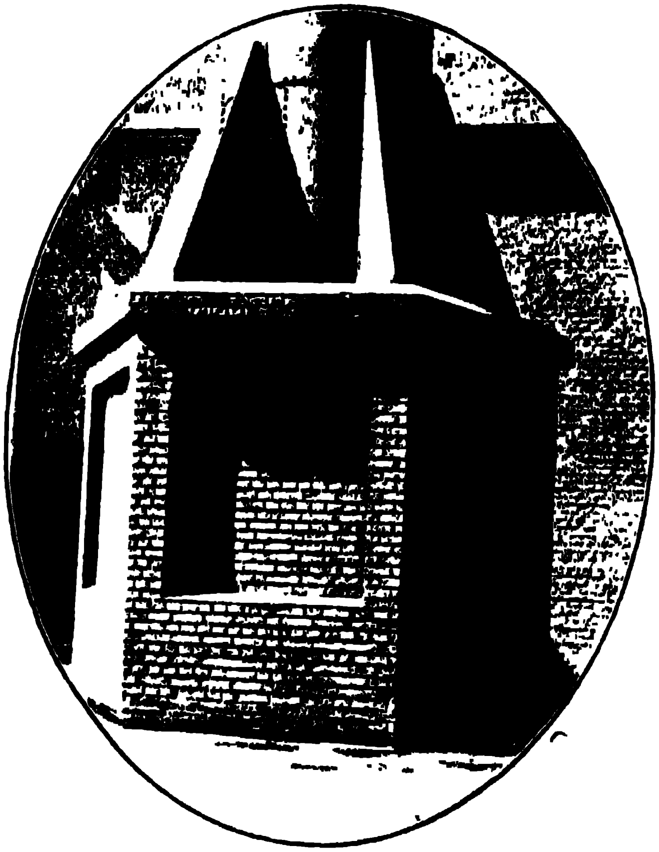
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEE

RANGOON, MADRAS,
BOMBAY, LONDON.

Steel Chimneys.





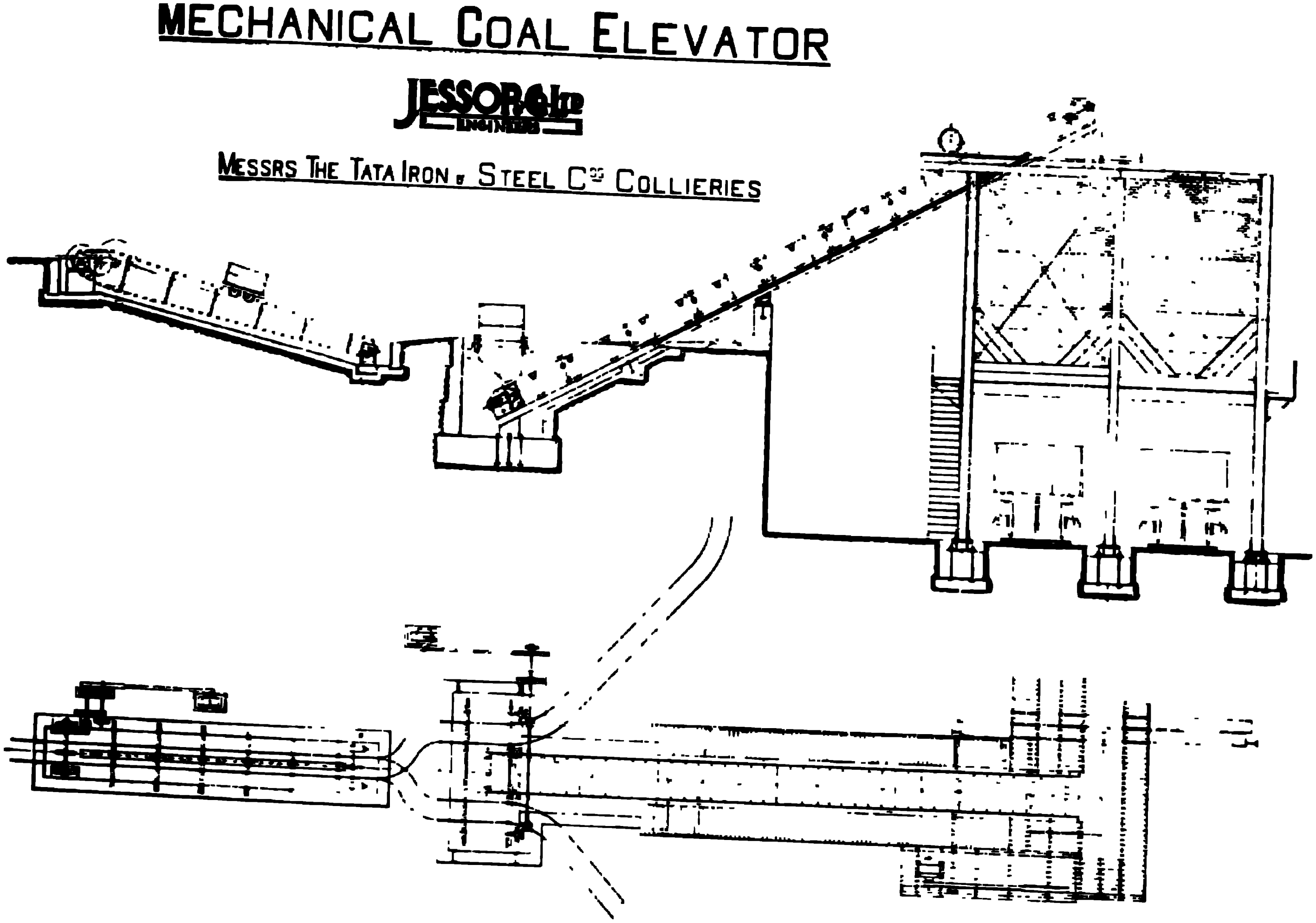
These illustrations show a Self-supporting Steel Chimney, 6 feet 6 inches internal dia. by 122 feet high, built by us, and erected at our Howrah Works in 1909.

CALCUTTA, JAMSHEDPUR.
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Coal Bunkers and Handling Plant.


MECHANICAL COAL ELEVATOR
JESSOP & Co. LTD ENGINEERS
MESSRS THE TATA IRON & STEEL Co. COLLIERIES

The bove shows diagrammatical [illegible] arrangement [illegible] allation [illegible] designed and compl ed by

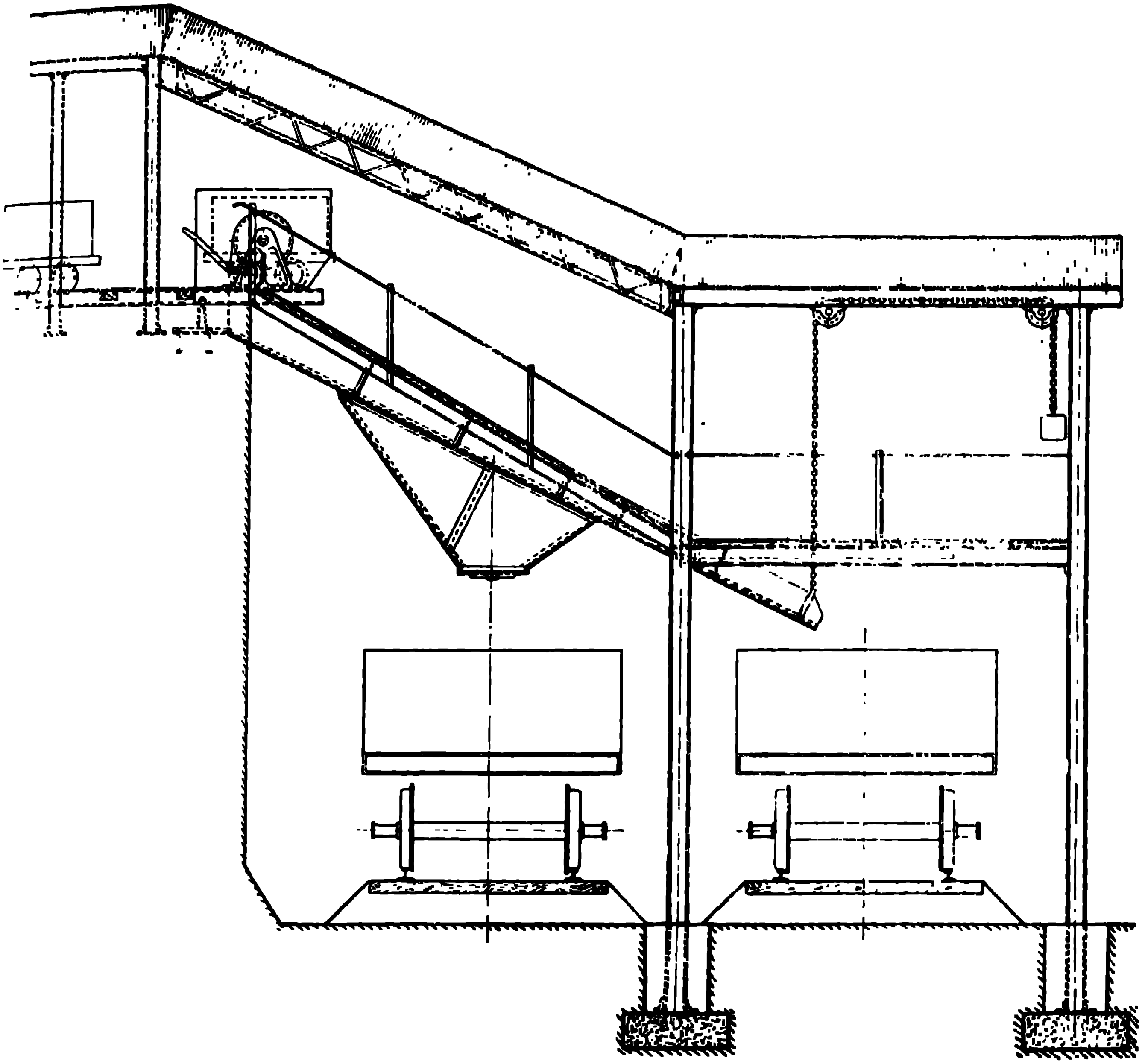
The full tubs gravitate from the Head Gears [illegible] the power driven [illegible] A Creeper [illegible] ates the [illegible] mpties wh gravitate back to the pits. The coal is elevated [illegible] an inclined plate c [illegible] and deliver [illegible] the end [illegible] a horizontal conveyor of the same type 140 feet long extending over the bunker [illegible] tem of ploughs [illegible] arranged [illegible] deliver the c [illegible] on either side at any point along the bunkers Two lines of rails [illegible] bel [illegible] bunke [illegible] and by [illegible] ans of large chut s, operated from the side platforms, coal wag ns can be loaded in a ery s [illegible] me [illegible] nd conv yor [illegible] e driven by four Electric Motors

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Coal Screening and Loading Plant.



The above illustration represents a simple and efficient Coal Screening and Loading Plant as made and supplied by us for Collieries in India.

An end tippler delivers the coal on to the sloping fixed bar screen, the small coal dropping through into the Billy Box and so into wagons on the small coal road, whilst the large coal passes over and is loaded into wagons on the outer road. The jib end of the chute is raised while the wagons are being changed

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

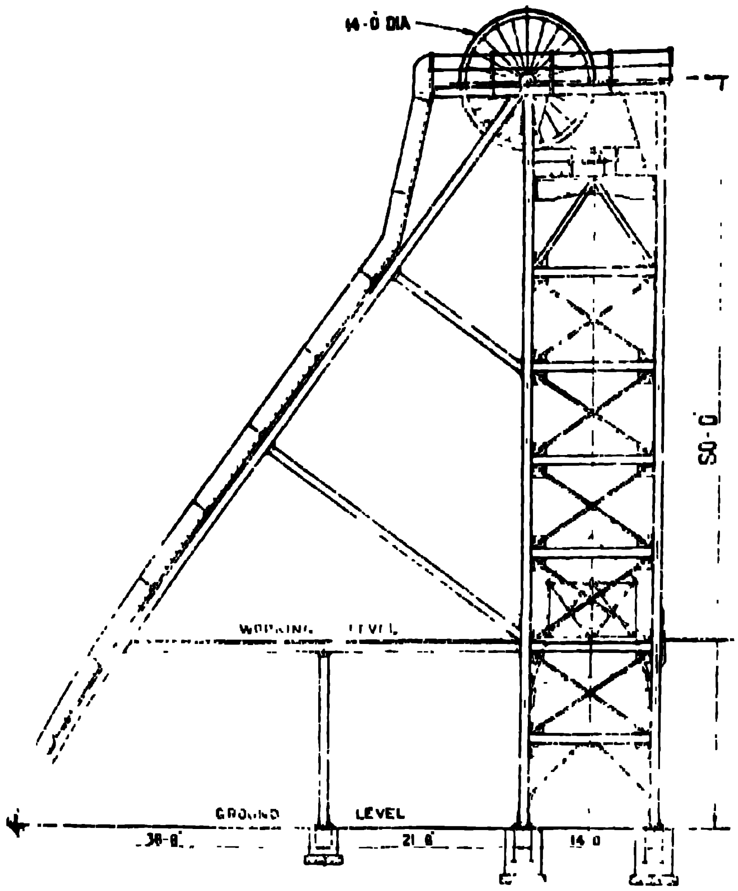
Pit Head Gears.

One of a pair of 80 feet Head Gears recently designed and constructed by us. They are of lattice construction, with 14 feet pulleys. An overhead gantry is fitted by means of which the pulleys can be raised and lowered clear of the side of the frame in case of necessity.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

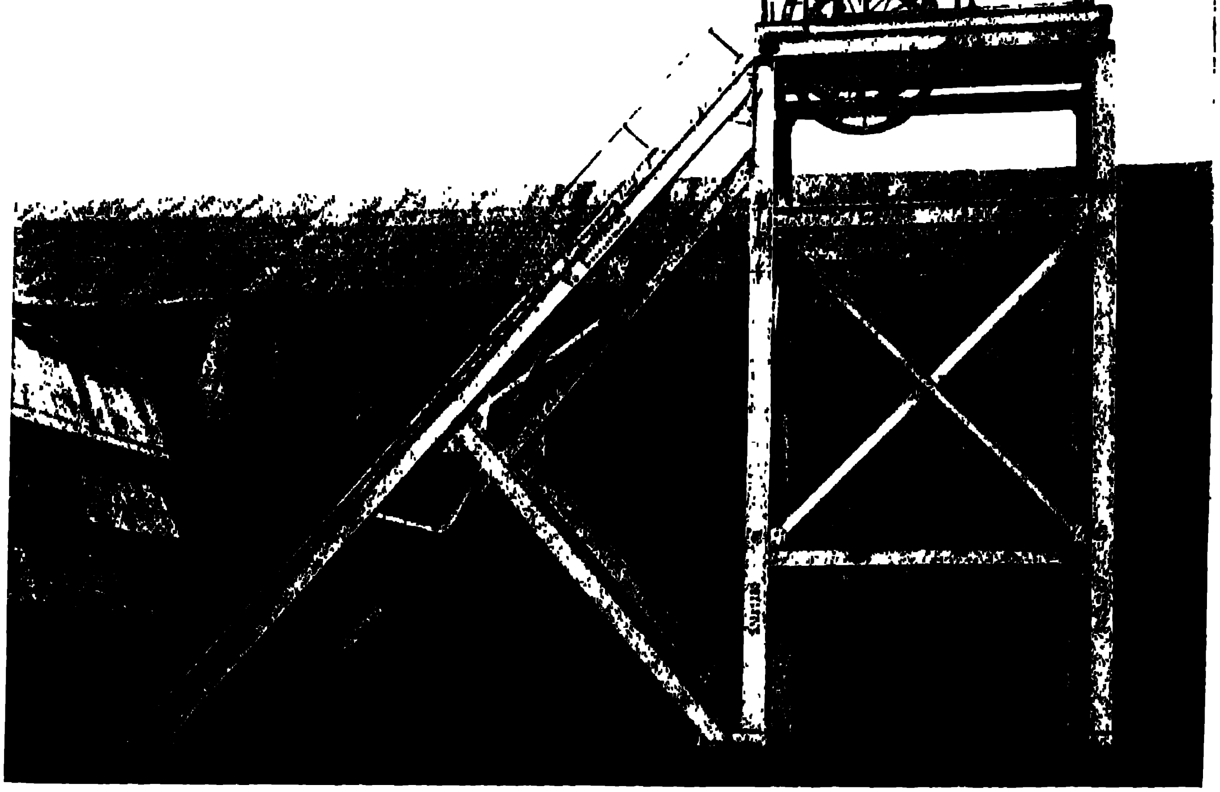
JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Pit Head Gears.

We illustrate two types of Pit Head Gears as built by us. The lower illustration shows a light type suitable for heights up to 40 feet. The upper one is suitable for deep winding, banking level being about 20 feet above the ground. Both designs are of R. S. Beams and Channels, and are of rigid construction.

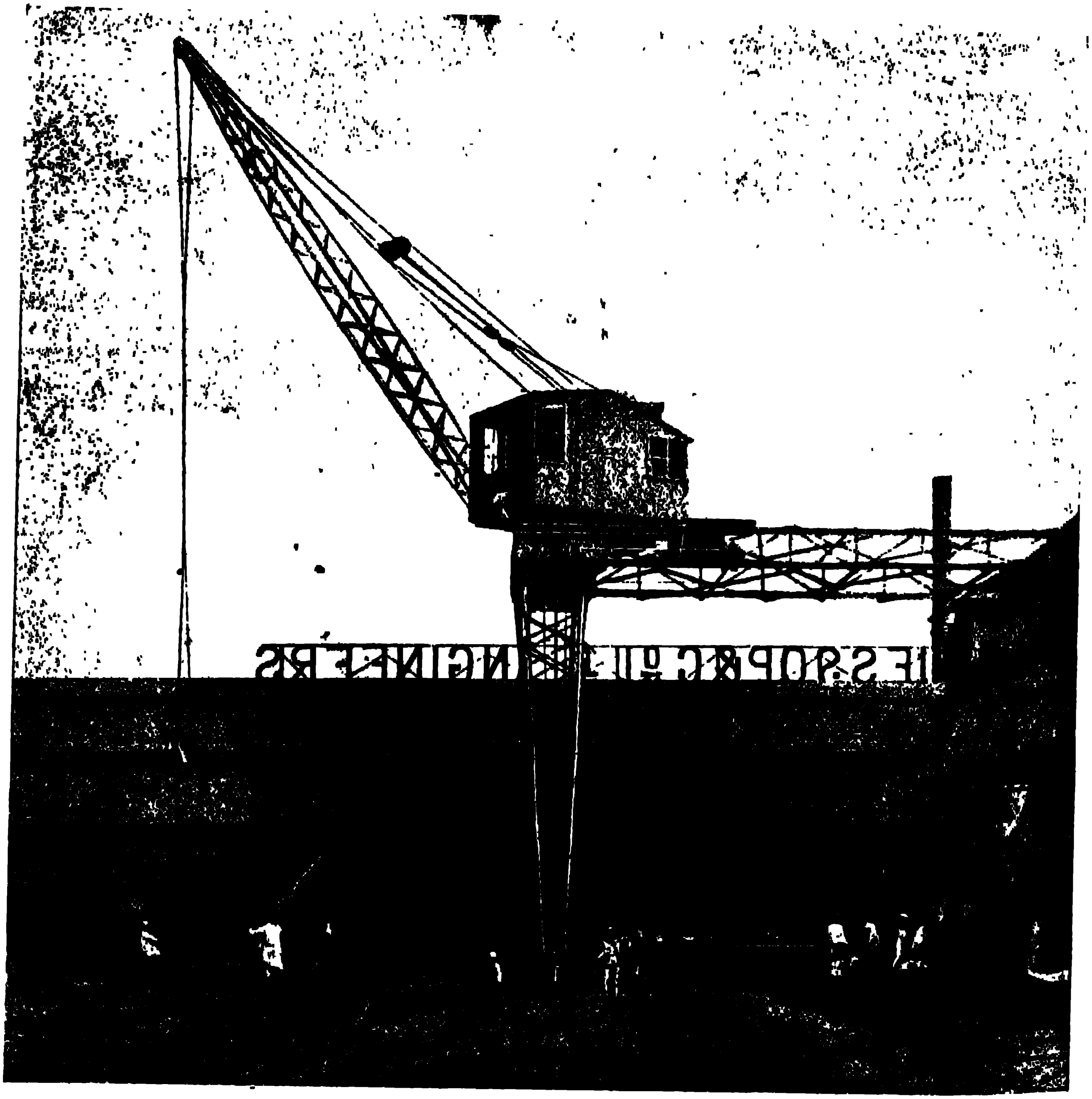


CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

3-Ton Semi-Portable Crane.



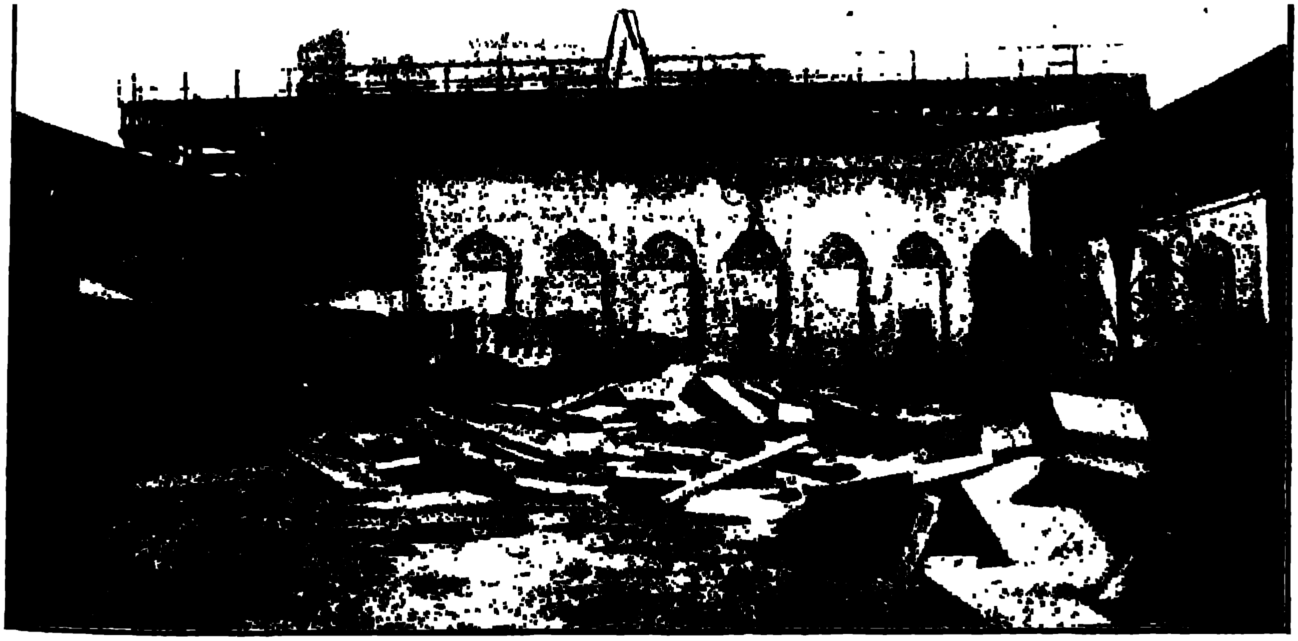
A new 3-Ton Semi-Portable Crane running the full length of our Structural Yard.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

15-Ton Overhead Crane.



This illustrates one of a large number of Overhead Cranes constructed by us for the Tata Iron and Steel Co., in connection with their recent extensive programme for enlargement of plant at Jamshedpur.

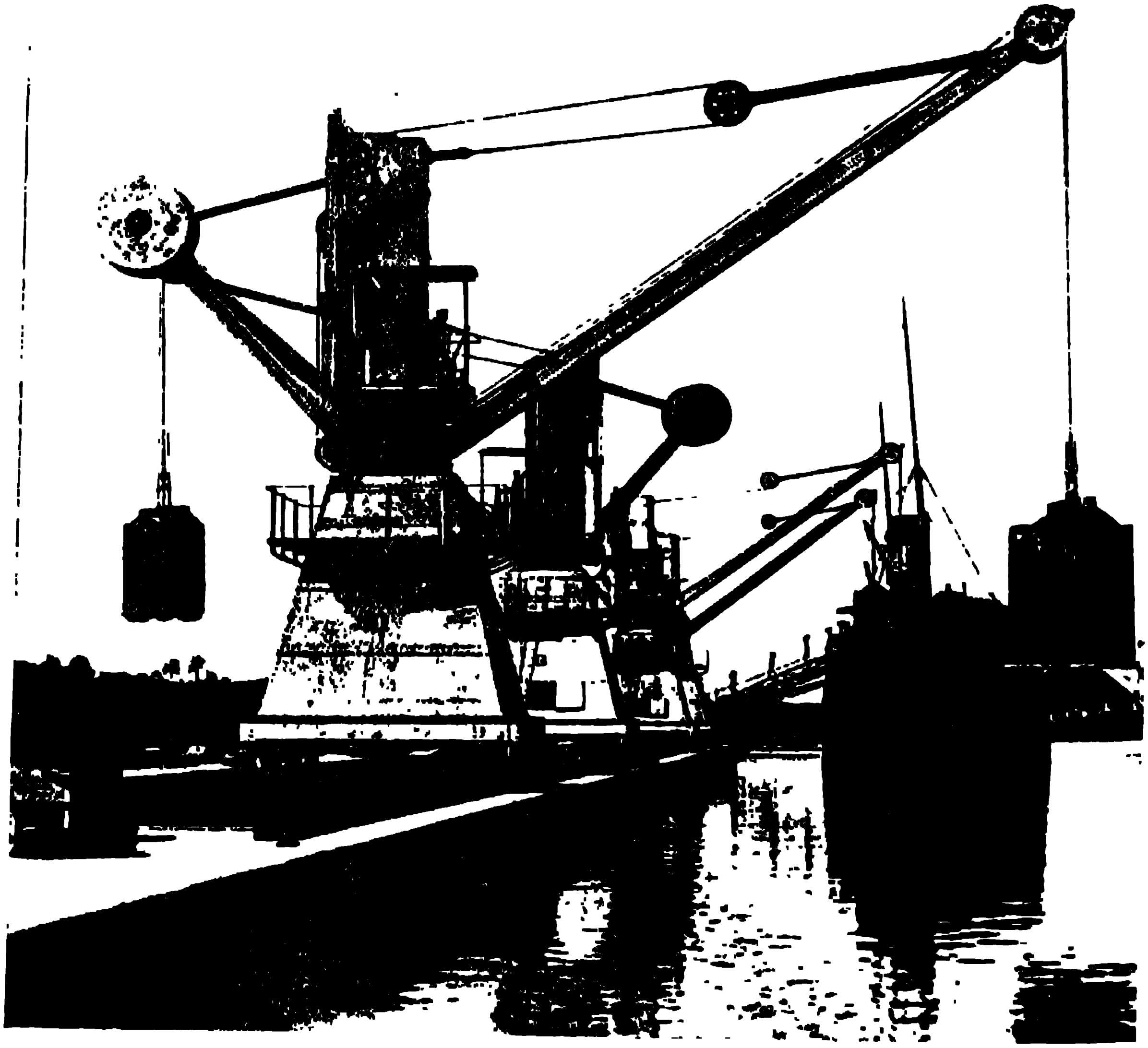
This crane carries a load of 15 Tons on a span of 97 ft. and serves the Plate Mill Stock Yard.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

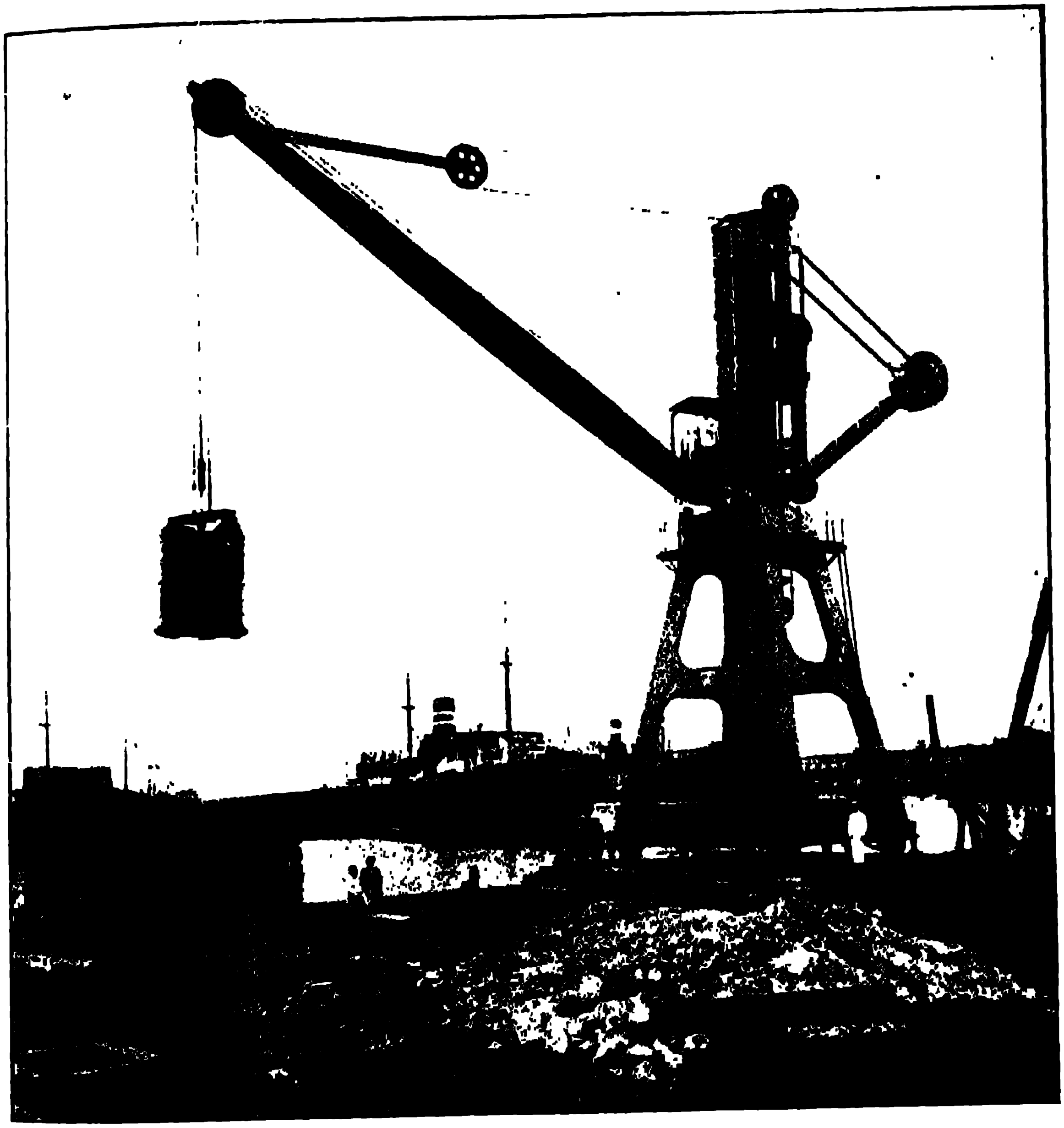
Hydraulic Coaling Crane.



8-Ton Hydraulic Coaling Crane.

The illustration above is of a battery of 8-ton Hydraulic Cranes of special design supplied by us to the Port Commissioners, Calcutta, in 1901. The cranes were designed, constructed and erected by us and have been in continuous use ever since. The radius of the cranes is 35 feet. The coal is brought up on a siding behind the cranes, and is emptied from the trucks into special travelling chutes. Each crane is fitted with a large cylindrical skip, which is swung round and lowered into a trough alongside the chutes, which can be emptied almost instantaneously into the skips. The skip is then raised and lowered into the hold of the vessel alongside. A special motion raises the side of the skip, the bottom of which is conical, and the coal falls out with a minimum of breakage.

Hydraulic Coaling Crane.



8-Ton Hydraulic Coaling Crane.

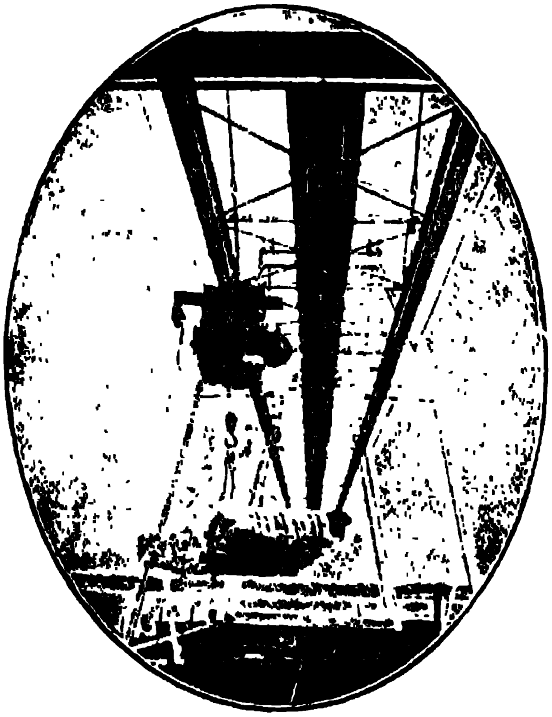
This illustration shows one of a battery of six cranes recently supplied by us to the order of the Port Commissioners, Calcutta. The cranes on the opposite page having proved so satisfactory in operation, the order for six more was entrusted to us, when the increasing requirements of the coal bunkering business rendered it necessary to provide additional plant at the docks. These cranes operate on the same principle as the original ones, but the height and reach is very much greater to suit the larger vessels now in use. The radius is 53 feet and the point of the jib when fully luffed is about 100 feet above quay level. The weight of each crane complete is about 80 tons. As before the whole of the design, manufacture and erection was carried out by our Calcutta Offices and Works.

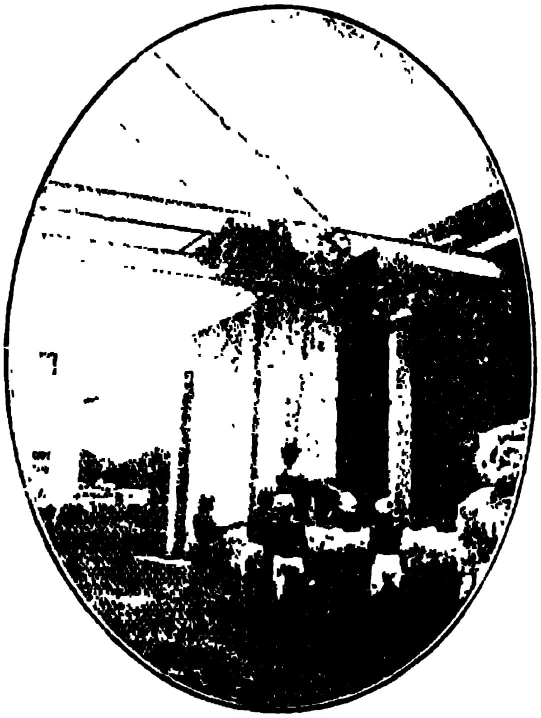
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEE

RANGOON, MADRAS,
BOMBAY, LONDON.

Electric Conveyors.





The Electric Conveyor shown above was built by us for a local Jute Mill. It is 360 feet long and is fitted with two electrically operated jennies. Its daily capacity is about 28,000 maunds of baled jute.

The oval picture on the left shows one of the jennies with its load, and the one on the right shows a jenny being loaded.

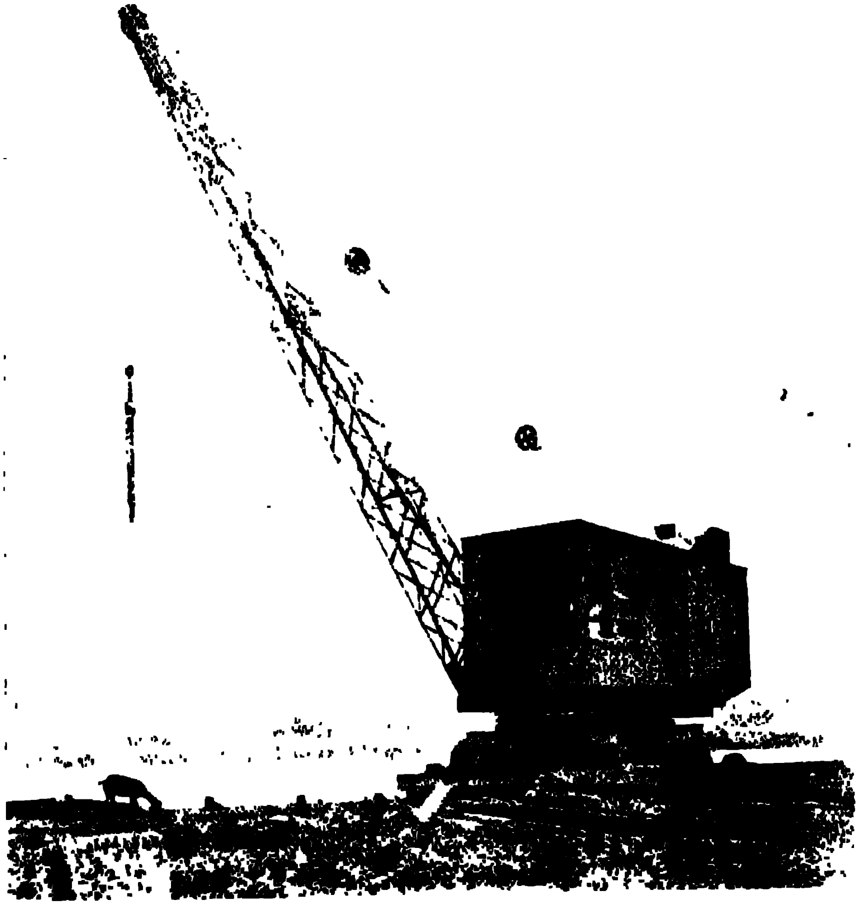
We have received a number of repeat orders for other mills, one of which is of a similar design and with a total length of 430 feet.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

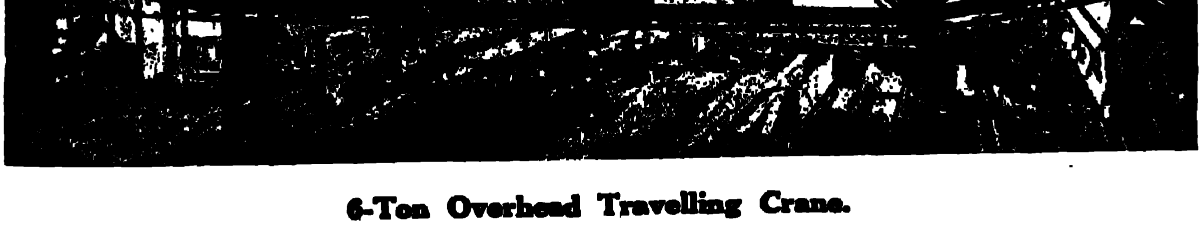
JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Electric Cranes.



The illustration shows a Four Motor Electric Crane with travelling, lifting, slewing and derrick motions, designed and erected by us. It is capable of lifting 2 tons at a radius of 35 feet with a speed of 200 feet per minute. The total height with the jib fully luffed is 60 feet.



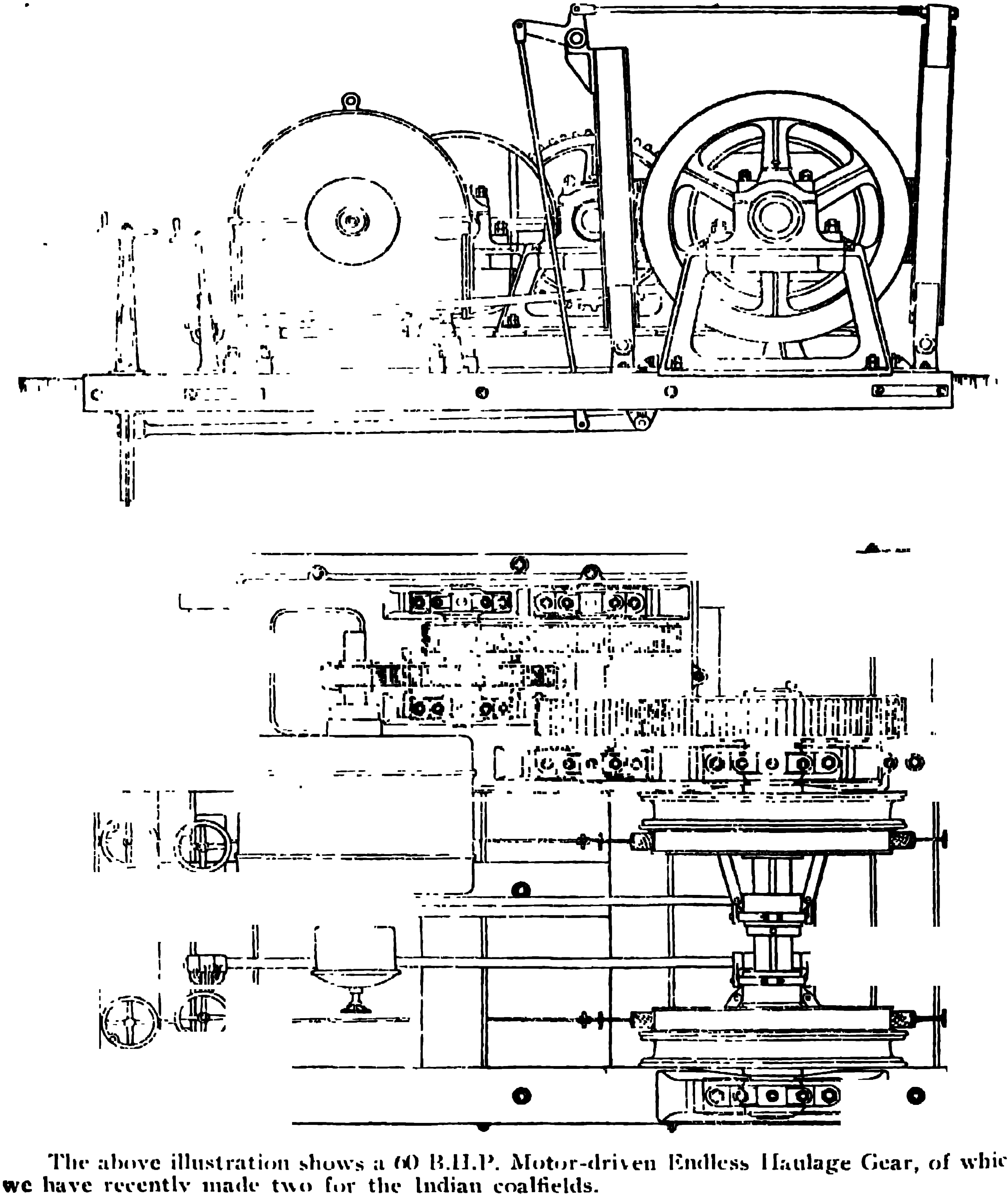
6-Ton Overhead Travelling Crane.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Electric Haulage Gear.



The above illustration shows a 60 B.H.P. Motor-driven Endless Haulage Gear, of which we have recently made two for the Indian coalfields.

Each Haulage has two Clifton Pulleys, 6 feet diameter; each pulley is driven through a friction clutch, and is fitted with brake gear. Thus the two pulleys can work at the same time or either one can be stopped whilst the other is working.

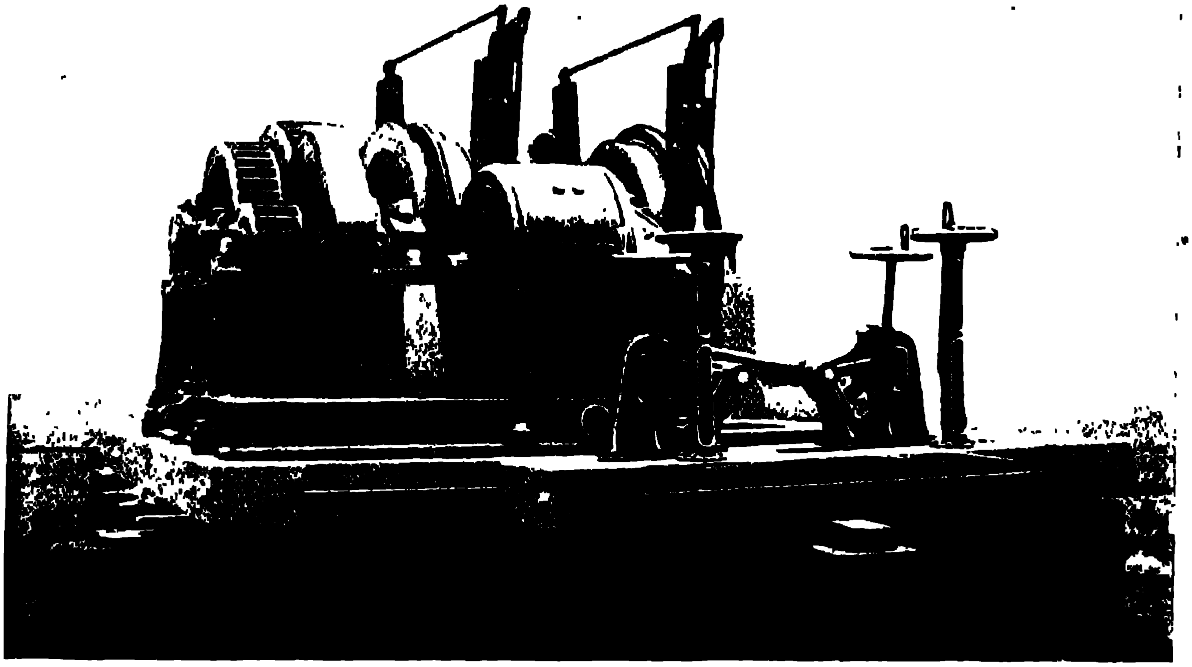
All control wheels are conveniently grouped together.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Electric Haulage and Reduction Gear.



An Electric Haulage.

There is no doubt that this type of haulage has many advantages over the steam engine. We have manufactured many electric haulages in the past and, we expect, that when some of the coalfields' electrification schemes are carried out, and power is available at low cost, there will be a greater demand for electric haulage, which will be fully justified by the eventual saving due to economical running costs.

Worm Reduction Gears.

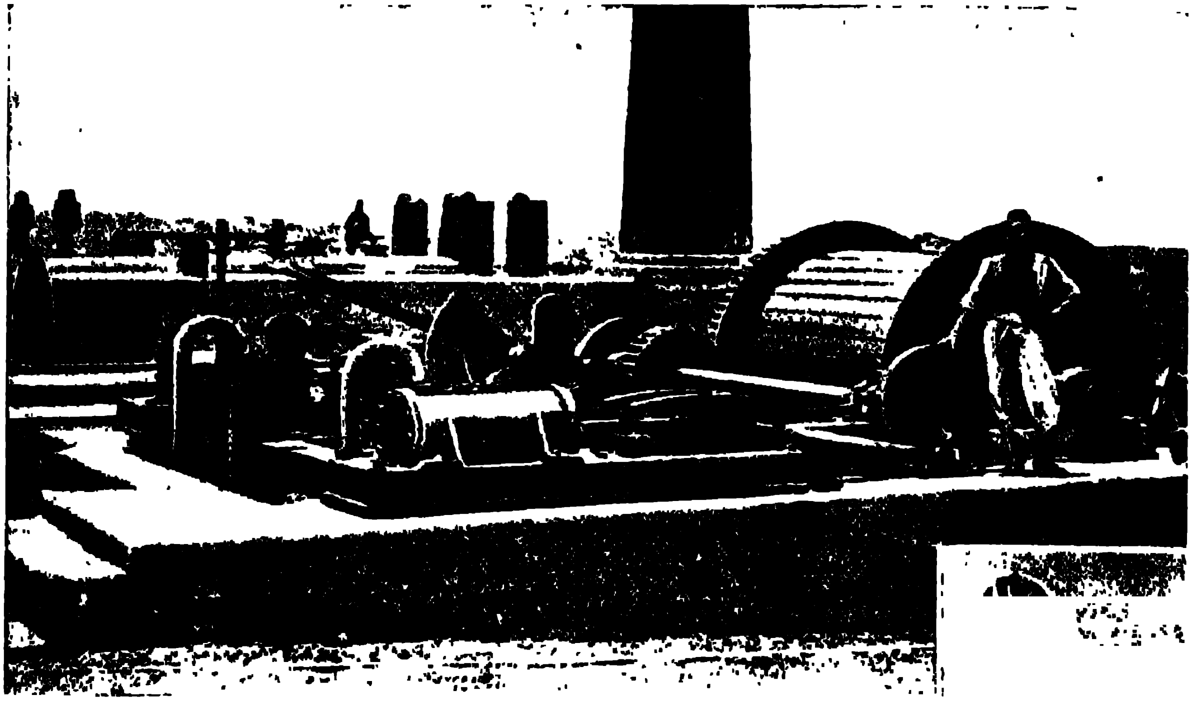
The illustration shows worm reduction gears as usually applied to electric haulage. The gears are self-contained, and cast-iron base plates are manufactured to suit constituents' motors and clifton wheels.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

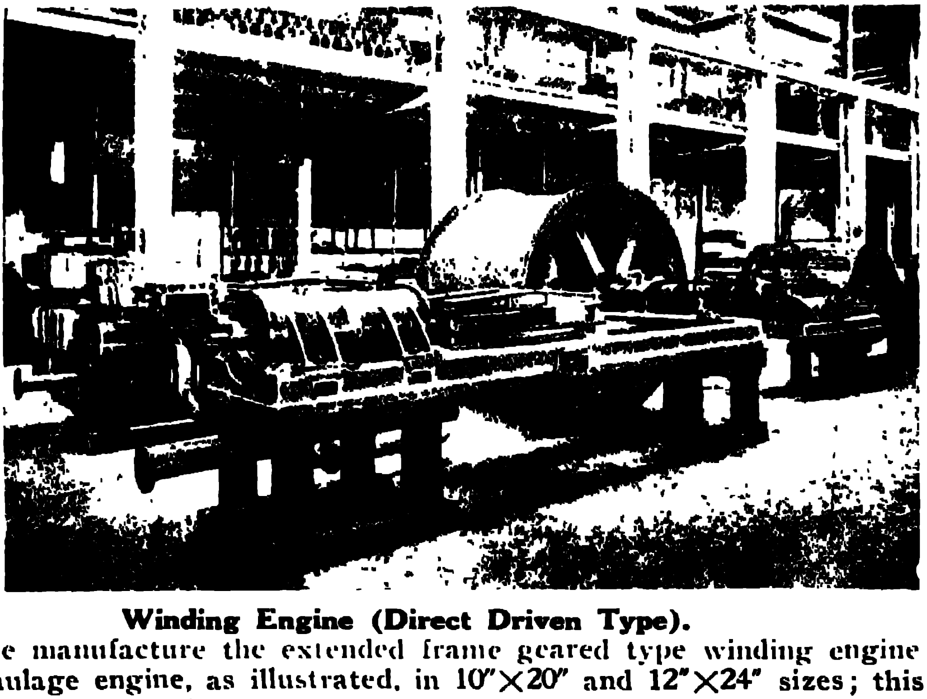
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Winding Engines.



Winding Engine (Geared Type).



Winding Engine (Direct Driven Type).

We manufacture the extended frame geared type winding engine and haulage engine, as illustrated, in 10"×20" and 12"×24" sizes; this is the most generally useful type for work in the coalfields.

The direct driven type of winding engine is usually larger than the geared type, the above showing a double cylinder 20"×40" which we can make up to order to meet those cases in which one 12"×24" is not sufficiently powerful. We can also supply intermediate sizes.

A Depth Indicator.

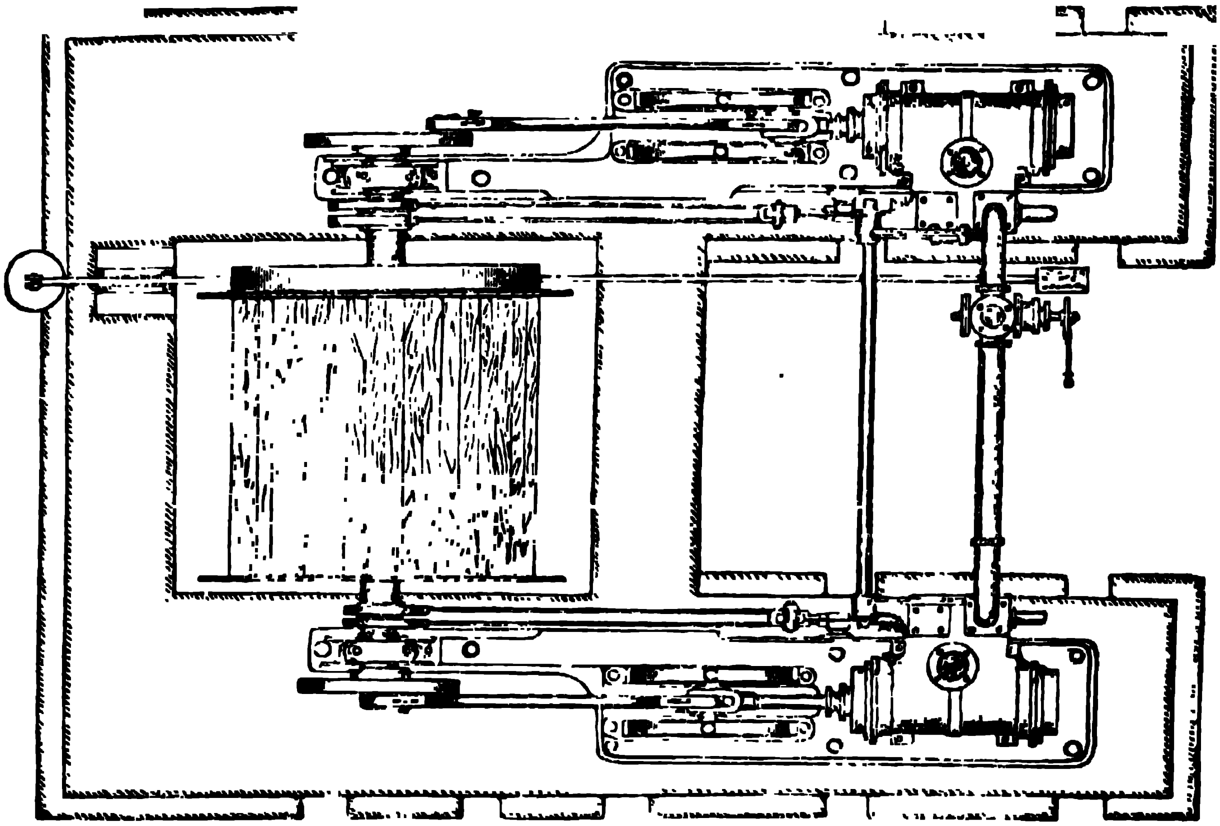
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Double Cylinder Winding Engine.

Direct Acting.



The above illustration represents our Double Cylinder High Pressure Winding Engine with Drum keyed direct on to the Engine Crankshaft, thus dispensing with heavy gearing. The Engine is constructed of the best material and workmanship. Mounted on massive Cast-Iron bedplates, it is designed throughout in the most careful manner, special attention being given to all journals, pins, and wearing surfaces, which are made extra-large to withstand wear. Extra-long connecting rods are supplied, and the reversing gear is carefully fitted, finished bright, and balanced, to ensure easy manipulation. Each Engine is run under steam before leaving the works.

The drum checks are made of either Cast or Wrought-Iron, and the drum barrel is lagged with wood or, if desired, with sheet steel.

A powerful foot-brake is supplied with renewable wood blocks, bolted on to posts of rolled steel **I** section.

All levers of reversing motion, valves, brake and other gears are conveniently placed for handling by one Engine-man.

A complete set of Oil-boxes and Lubricators, Holding-down Bolts and Nuts and a set of Spanners are supplied with each Engine.

Further Particulars and Prices on application.

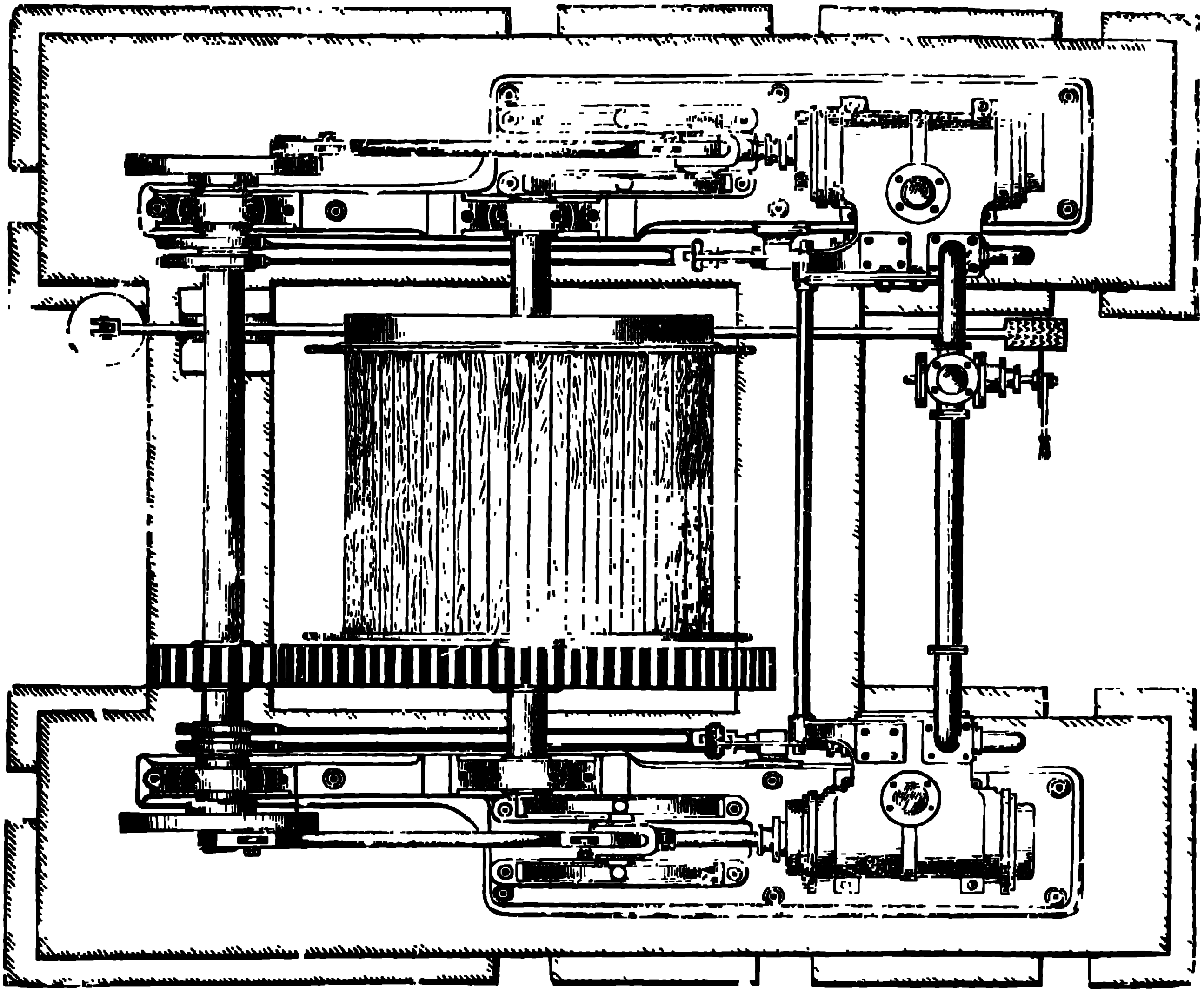
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Double Cylinder Geared Winding Engine.

Short Frame.



The above illustration represents our Double Cylinder High Pressure Geared Winding Engine with Short Frame. The Engine is constructed of the best material and workmanship. Mounted on massive Cast-Iron bedplates, it is designed throughout in the most careful manner, special attention being given to all journals, pins, and wearing surfaces, which are made extra large to withstand wear. Extra-long connecting rods are supplied, and the reversing gear is carefully fitted, finished bright, and balanced, to ensure easy manipulation. Each Engine is run under steam before leaving the works.

The gear wheel and pinion are of Cast-Iron, of very heavy design.

The drum cheeks are made of either Cast or Wrought-Iron, and the drum barrel is lagged with wood or, if desired, with sheet steel.

A powerful foot-brake is supplied with renewable wood blocks, bolted on to posts of rolled steel I section.

All levers of reversing motion, valves, brake and other gears are conveniently placed for handling by one Engine-man.

A complete set of Oil-boxes and Lubricators, Holding-down Bolts and Nuts, and a set of Spanners are supplied with each Engine.

Further Particulars and Prices on application.

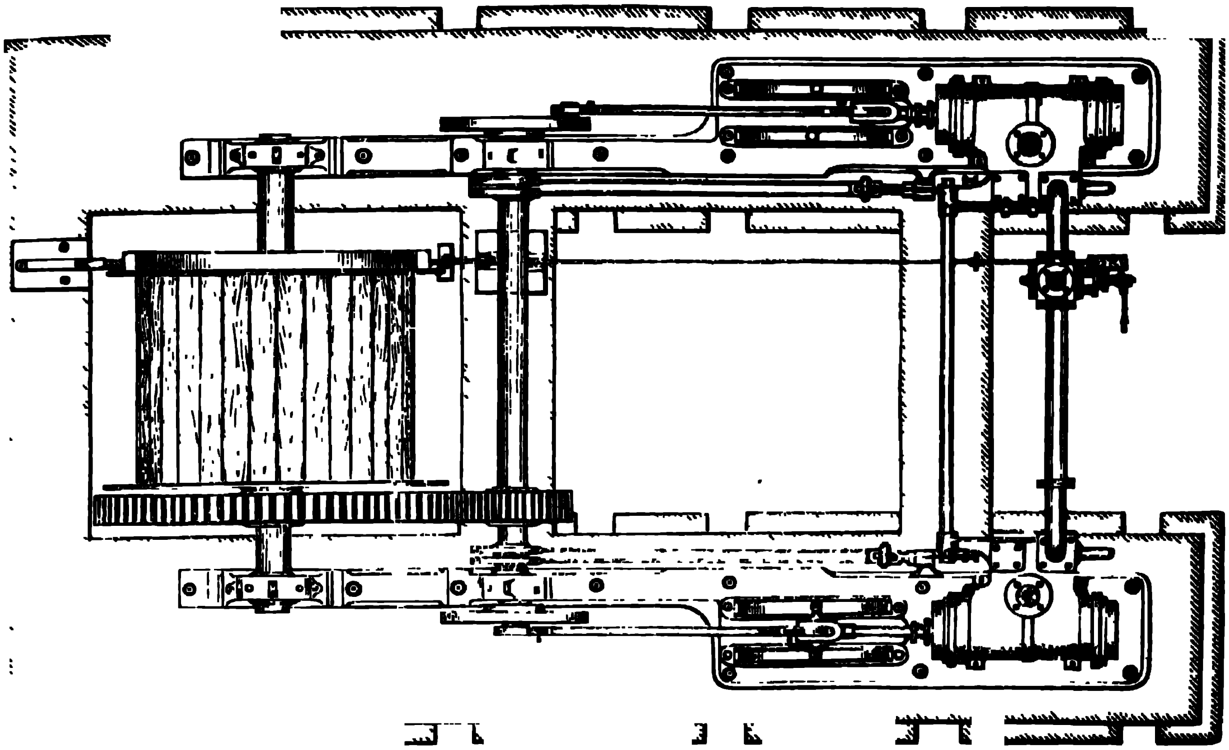
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Double Cylinder Geared Winding Engine.

Extended Frame.



The above illustration represents our Double Cylinder High Pressure Geared Winding Engine with Extended Frame. The Engine is constructed of the best material and workmanship. Mounted on massive Cast-Iron bedplates, it is designed throughout in the most careful manner, special attention being given to all journals, pins, and wearing surfaces, which are made extra-large to withstand wear. Extra-long connecting rods are supplied, and the reversing gear is carefully fitted, finished bright, and balanced, to ensure easy manipulation. Each Engine is run under steam before leaving the works.

The gear wheel and pinion are of Cast-Iron, of very heavy design.

The drum checks are made of either Cast or Wrought-Iron, and the drum barrel is lagged with wood or, if desired, with sheet steel.

A powerful foot-brake is supplied with renewable wood blocks, bolted on to posts of rolled steel I section.

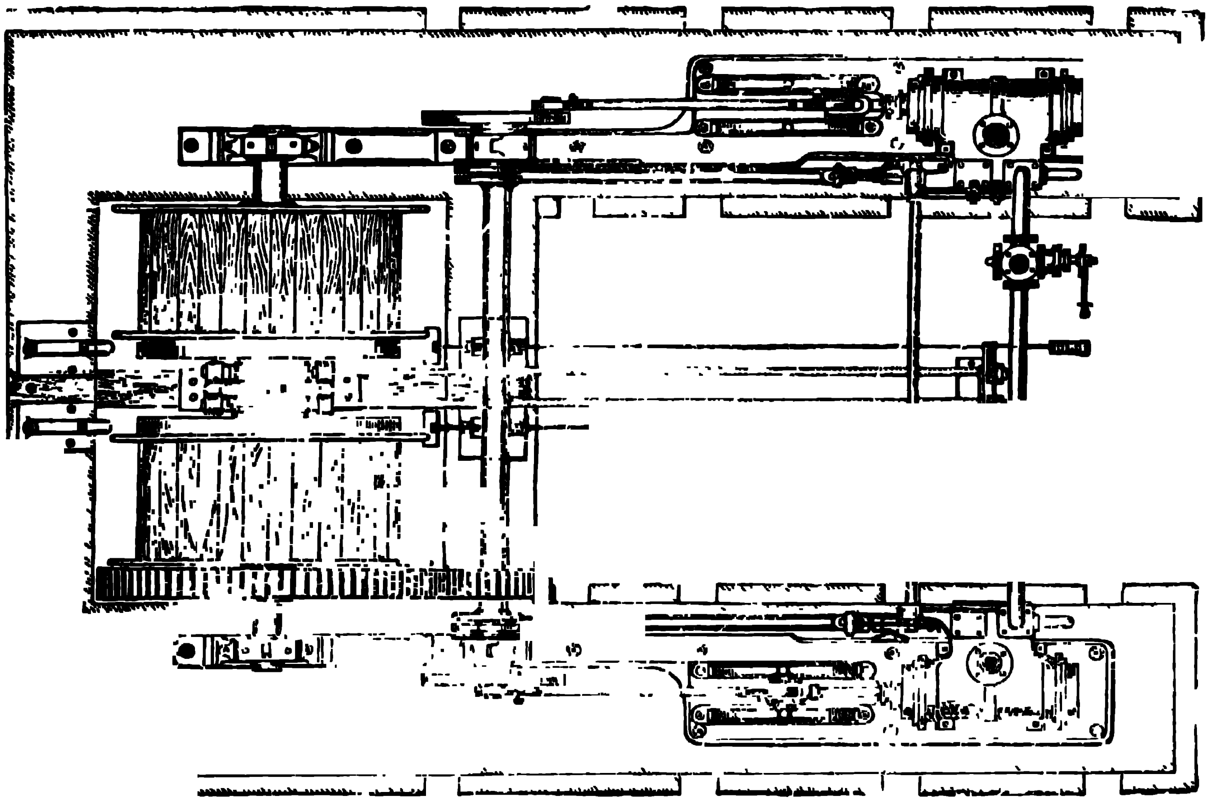
All levers of reversing motion, valves, brake and other gears are conveniently placed for handling by one Engine-man.

A complete set of Oil-boxes and Lubricators, Holding-down Bolts and Nuts, and a set of Spanners are supplied with each Engine.

Further Particulars and Prices on application.

Double Cylinder Geared Hauling Engine.

Extended Frame and Clutched Drums.



The above illustration represents our Double Cylinder High Pressure Geared Hauling Engine with Extended Frame, fitted with two Drums, brass bushed, running loose on shaft and worked by clutch gear operated by hand levers. The Engine is constructed of the best material and workmanship. Mounted on massive Cast-Iron bedplates, it is designed throughout in the most careful manner, special attention being given to all journals, pins and wearing surfaces, which are made extra-large to withstand wear. Extra-long connecting rods are supplied, and the reversing gear is carefully fitted, finished bright, and balanced, to ensure easy manipulation. Each Engine is run under steam before leaving the works.

The gear wheel and pinion are of Cast-Iron, of very heavy design.

The drum cheeks are made of either Cast or Wrought-Iron, and the drum barrels are lagged with wood or, if desired, with sheet steel.

A powerful foot-brake is supplied for each drum with renewable wood blocks, bolted on to posts of rolled steel I section.

All levers of reversing motion, valves, brake, and other gears are conveniently placed for handling by one Engine-man.

A complete set of Oil-boxes and Lubricators, Holding-down Bolts and Nuts, and a set of Spanners are supplied with each Engine.

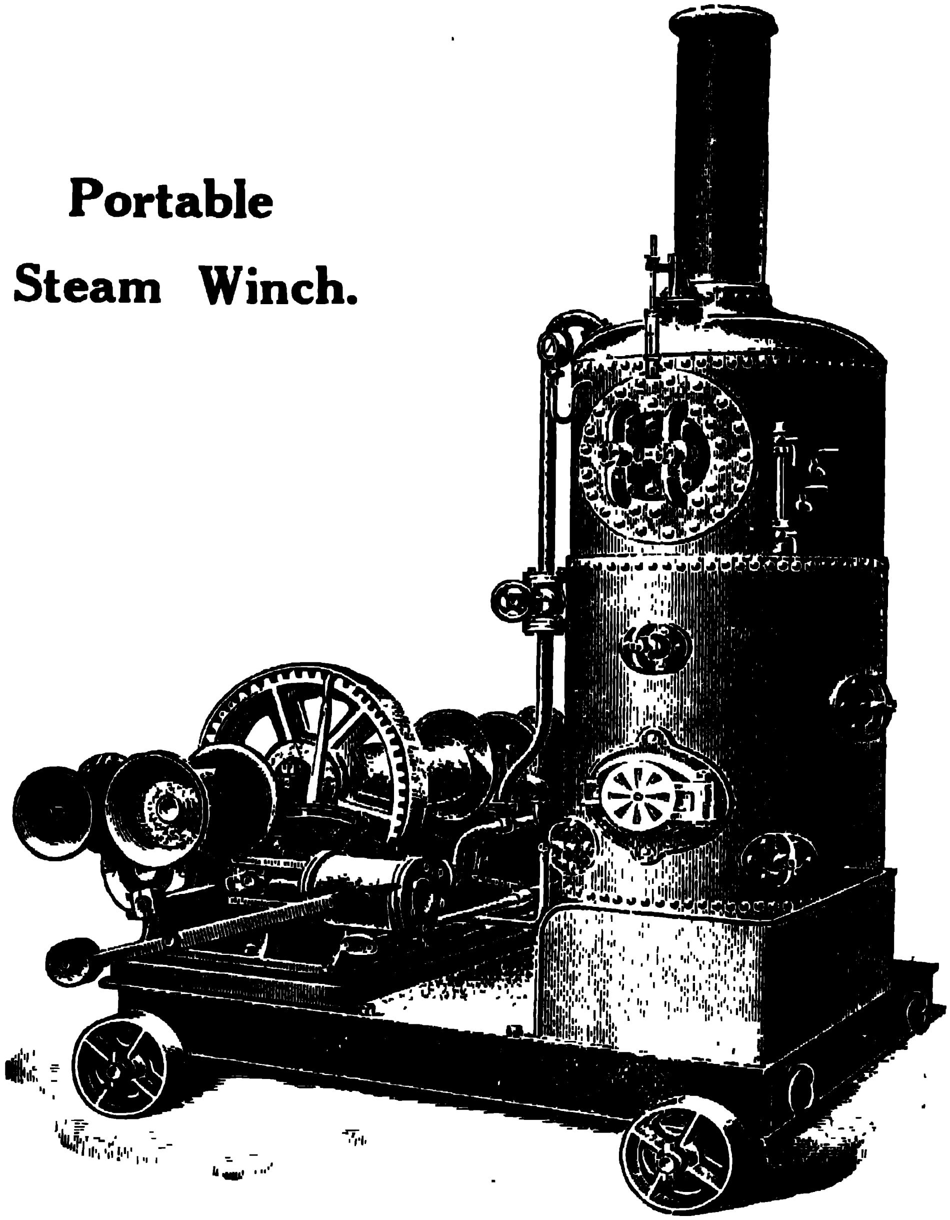
Further Particulars and Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Portable Steam Winch.



Horizontal Cylinder Type, with Vertical Boiler.

These Engines are specially designed for the use of contractors, and for general hauling and lifting purposes. The cylinders are fitted in a horizontal position and have link reversing action, and the brake is arranged for manipulation by a foot lever. The gearing is single and double purchase and warping drums are fitted to the ends of the barrel shaft, and quick whipping drums are fitted on the intermediate shaft.

The boiler is of the vertical cross-tube type, and all mountings and pipe connections are supplied complete. The engine and boiler are mounted upon a strong tank which forms a feed heater and carriage, and this is carried upon axles fitted with broad wheels to facilitate transportation.

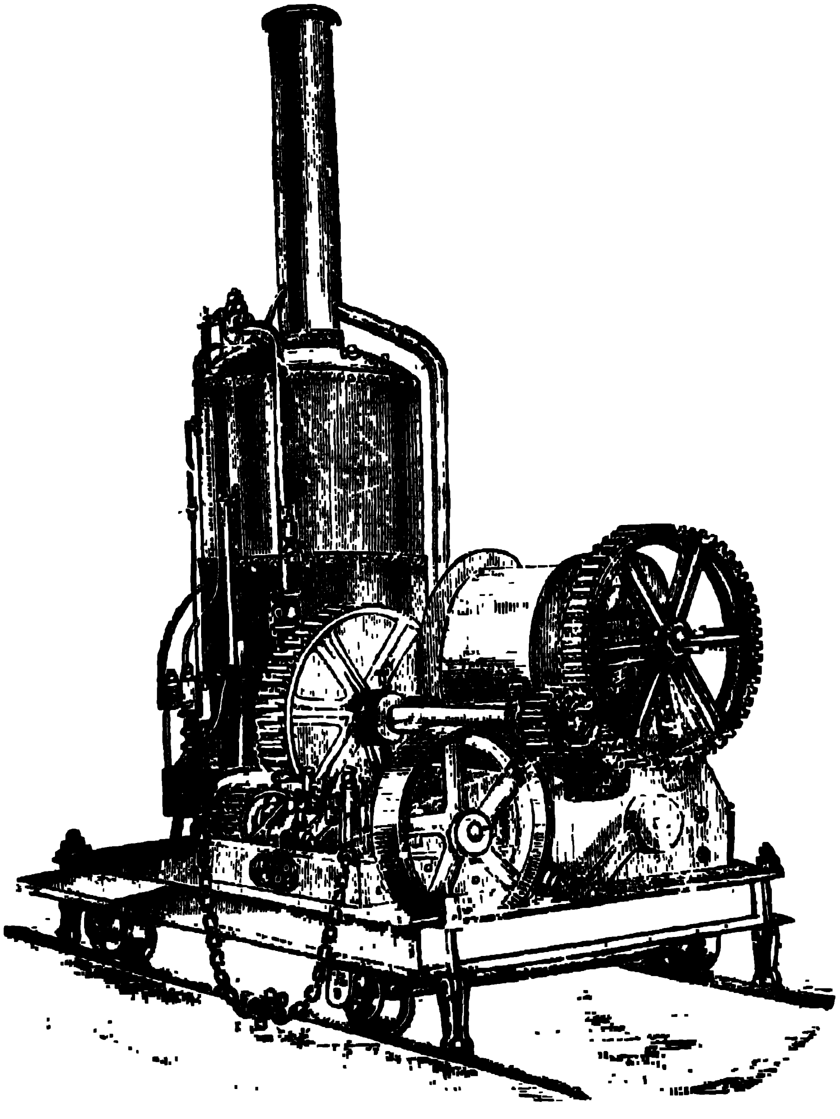
Particulars and Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Portable Steam Winch.



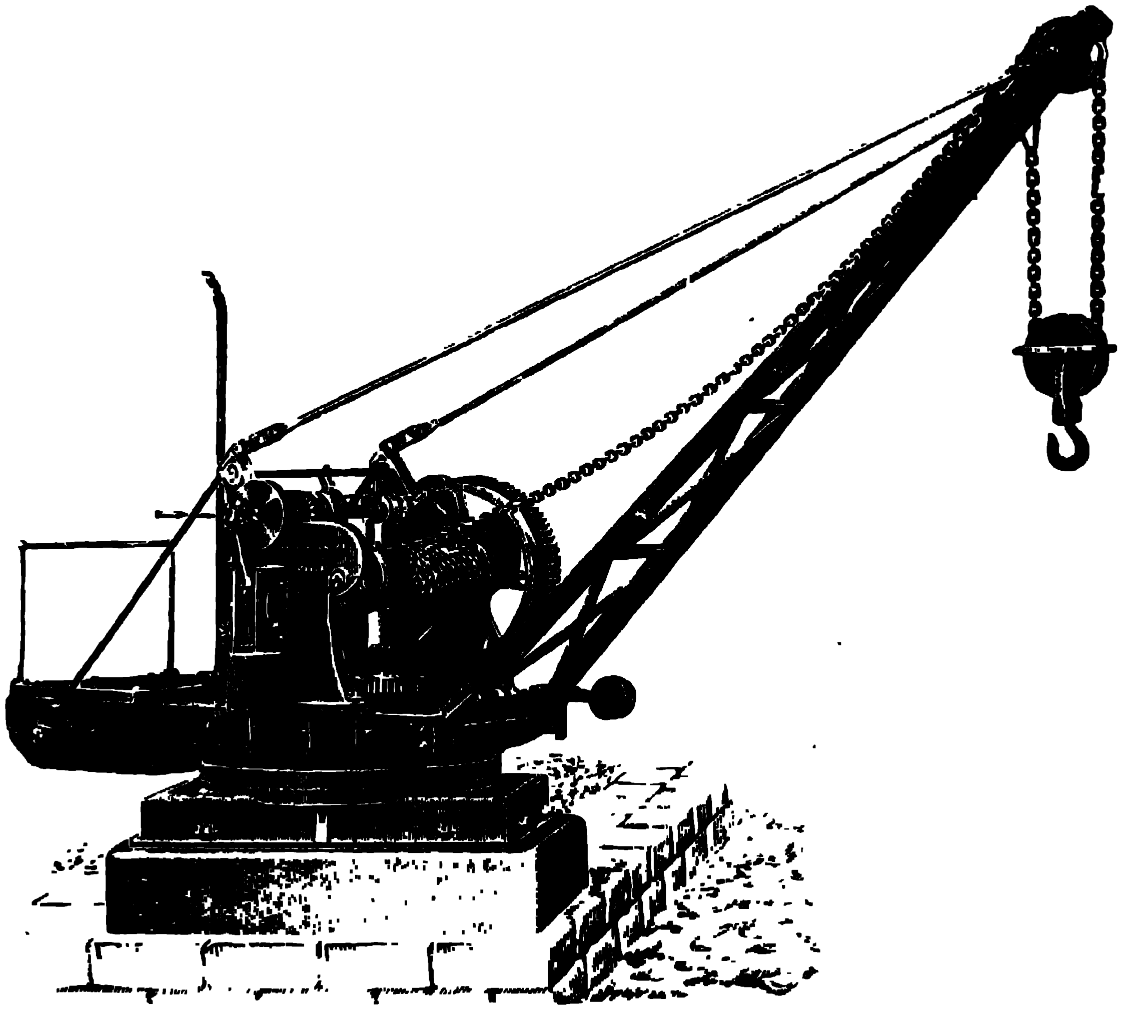
The above illustration represents a Hoisting Engine with cast-iron drum for hoisting weights at a speed of about 100 feet per minute. It is double geared and mounted on a wrought-iron carriage so arranged that the pull is at right angles to the direction in which it travels. This arrangement is well adapted for use in well-sinking for bridge foundatio as one hoist can be run along a range of wells in a straight line without trouble.

The engine and boiler are constructed throughout of the very best materials.

The boiler is designed and staved for a working pressure of 80 lbs. per square inch, and tested and made tight under hydraulic pressure.

Particulars and Prices on application.

Fixed Steam Crane.



The illustration shows the arrangement of a Fixed or Deck Steam Crane taking its steam from a main pipe line laid from an independent boiler. It is provided with the necessary steam connections from the base plate to the engines and includes a bend at the bottom of the post for coupling up to the main steam pipe.

Particulars and Prices on application.

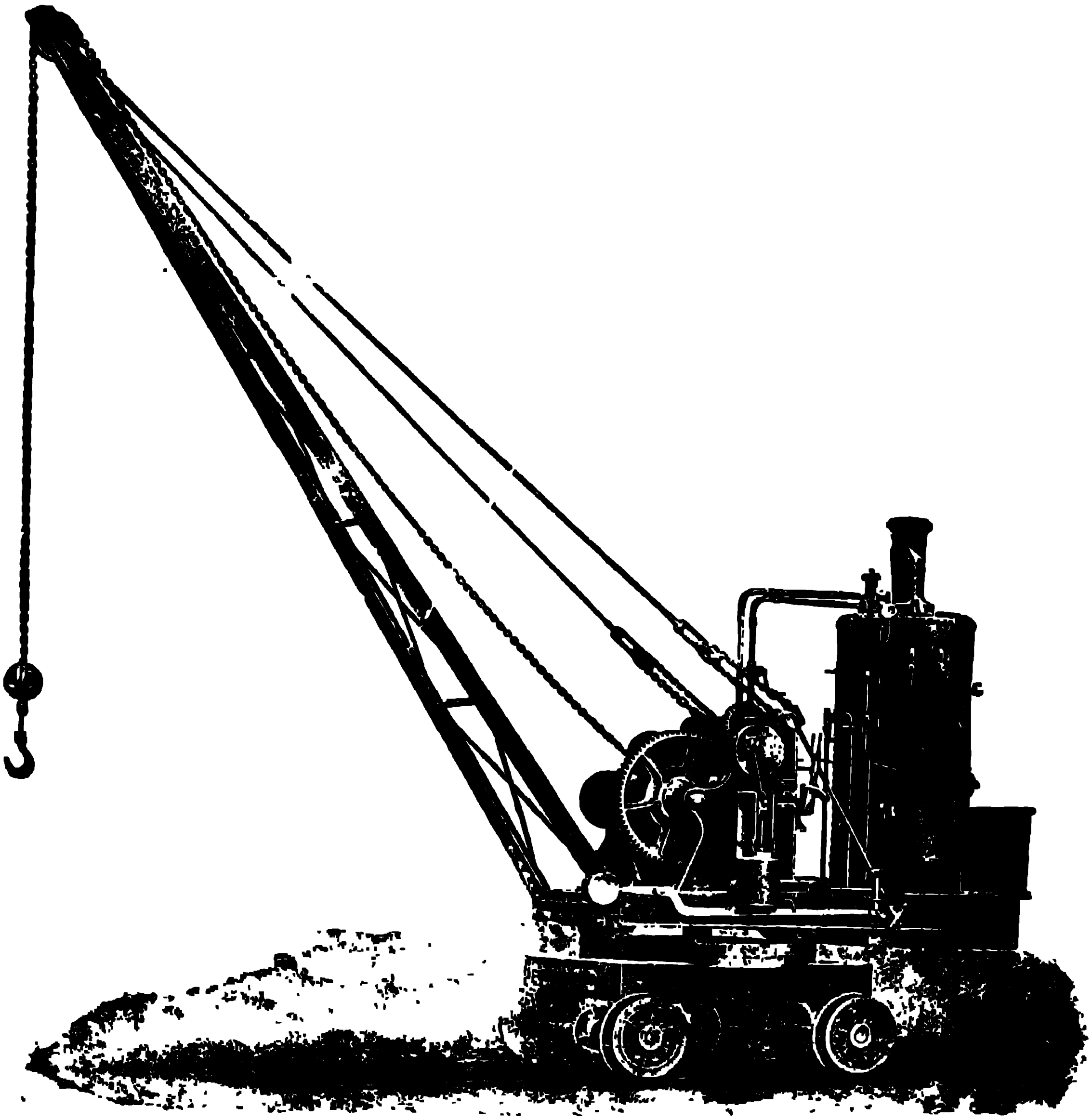
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Locomotive Steam Cranes.

2 and 3-Ton Sizes.



Complete with Lifting, Slewing, Travelling and Derrick motions for a 5 ft. 6 ins. rail gauge

The Cranes are thoroughly tested before despatch and are provided with the usual Stoking Tools, Spanners, etc.

Particulars and Prices on application.

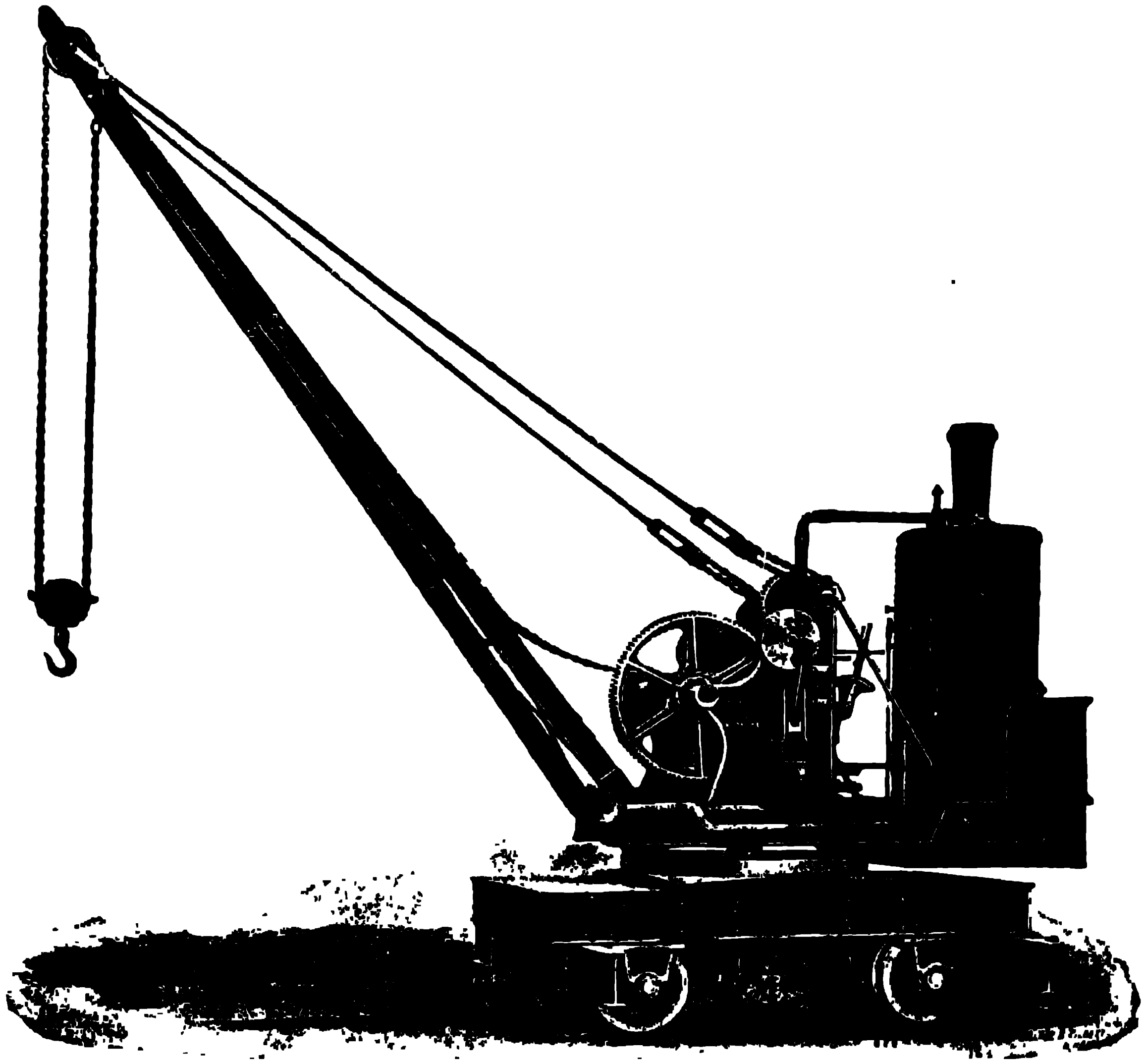
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Locomotive Steam Cranes.

5 to 10-Ton Sizes.



5-Ton Pattern.

Complete with Lifting, Slewing, Travelling and Derrick motions, and wrought-iron carriage, for 5 ft. 6 ins. rail gauge, with cross girders for blocking up when lifting the maximum load.

The Cranes are thoroughly tested before despatch and are provided with the usual Stoking Tools, Spanners, etc.

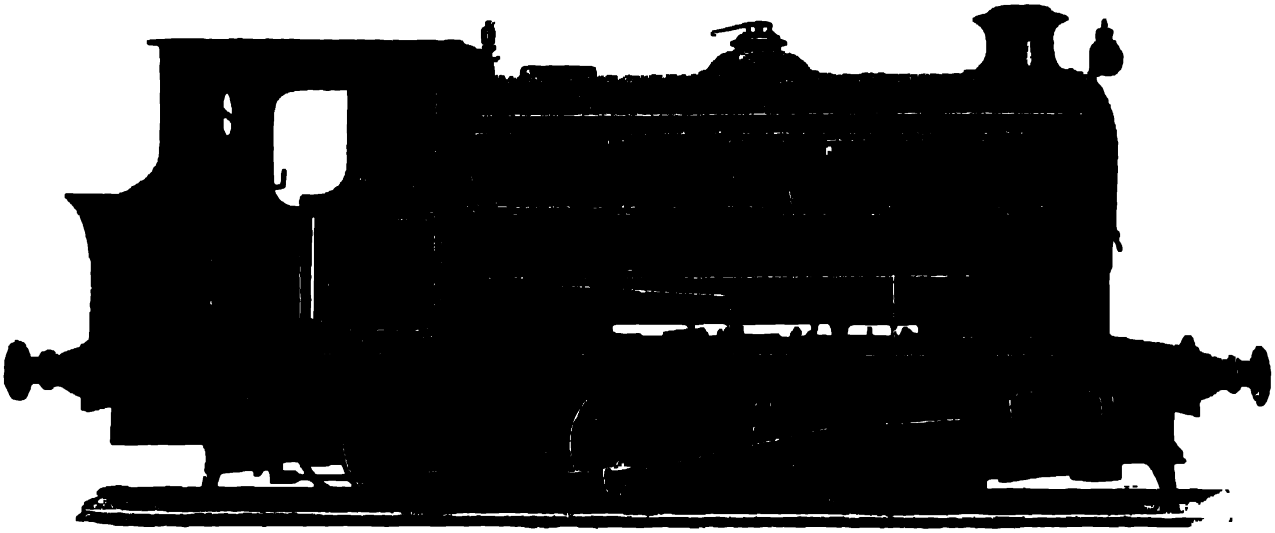
Particulars and Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

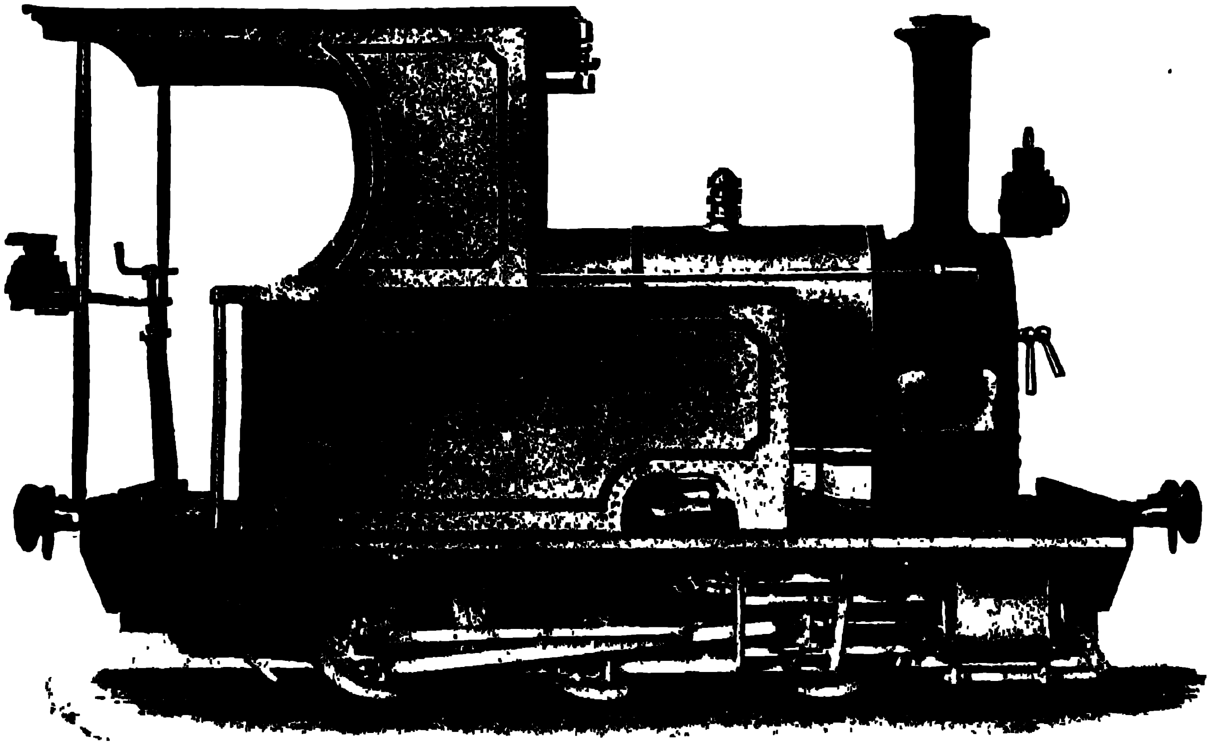
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Avonside Locomotives.



Class H. 16 by 24 ins. Outside Cylinders, Saddle Tank Locomotive Engine for 5 ft. 6 ins. gauge as supplied to the Calcutta Port Commissioners.



Class N.B. 6 by 10 ins. Outside Cylinders, Side Tank Locomotive Engine for 2 ft. to 3 ft. 6 ins. gauge.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Avonside Locomotives. (Standard Gauge.)

Few manufacturers of Locomotives have studied the conditions obtained in India and bodied the results in their products as have the Avonside Engineering Co., Ltd., Bristol, ngland.

The Company was formed over 75 years ago and their Locomotives are to be met with ll parts of the world where Railways exist or where efficient and economical Transport d Haulage is given its proper place.

Large numbers of broad and narrow gauge units have been supplied in this country to Collieries, all kinds of Industrial Establishments, and Public Authorities such as the Calcutta Port Commissioners and the Calcutta Corporation

The Calcutta Port Commissioners have placed several repeat orders for these locomotives, and considering the exacting service, no greater testimony could be given to the very high standard of materials and workmanship and suitability of design

Any size or type of Locomotive or Steam Railway Motor Car can be supplied and we shall be glad to advise and quote for any special requirement and to add to the necessarily brief information contained here

Some Users of Avonside Locomotives in India.

Calcutta Port Commissioners.

6 Broad Gauge Locomotives in 1908.
6 „ „ „ .. 1921.
5 „ „ „ . 1923.
2 „ „ , .. 1924.

Bombay Improvement Trust.
Dehri Rohtas Light Railway.

Calcutta Corporation.

2 Broad Gauge Locomotives in 1912

The above engines will haul 1,180 tons on the level exclusive of their own weight.

Class N.B. 6 by 10 ins., Type 0-6-0, Side Tank Locomotive.

Gauge 2 ft. to 3 ft. 6 ins.

The engine, as illustrated on the opposite page, is of the outside cylinder class having a 6 coupled wheelbase of 5 ft. The boiler shell is of the best Open-hearth Steel, hydraulically riveted and tested to meet the requirements of the British Standard Specification. Best selected copper is used in the construction of the Internal Fire box and the Tubes are of solid drawn seamless Brass, ferruled at the Fire box end The Frame is made from one solid plate of O. H. Steel and the wheels are of strong Cast-Iron fitted with weldless O. H. Steel Tyres. Valve motion of the Walschaerts type. Saddle Tank Locos of the same capacity can be supplied if preferred

Cylinders, Diameter		6"
„ Stroke		10"
Working Pressure	lbs. per sq. in	150
Diameter of Coupled Wheels	..	1' 8"
Coupled Wheelbase	..	5' 0"
Total Wheelbase ..	.	5' 0"
Total Heating Surface	sq. ft.	103
Grate Area	„	4½
Tank Capacity	gallons	120
Bunker Capacity ..	cwts.	4½

Weight of Engine, Empty ..	tons	5½
„ „ Full ..	„	6½
Minimum Weight of Rail per yd.	lbs.	12
Sharpest Curve	feet	60
Tractive Effort at 80% B P. ..	lbs.	2,160
Locomotive will Haul up on 1 in 40	tons	24
„ „ „ „ 1 „ 50	„	30
„ „ „ „ 1 „ 75	„	42
„ , „ „ 1 „ 100	„	54
„ „ „ on Level	„	174
Price, as illustrated ..	**Rs.**	**21,340**

Detailed specification on application.

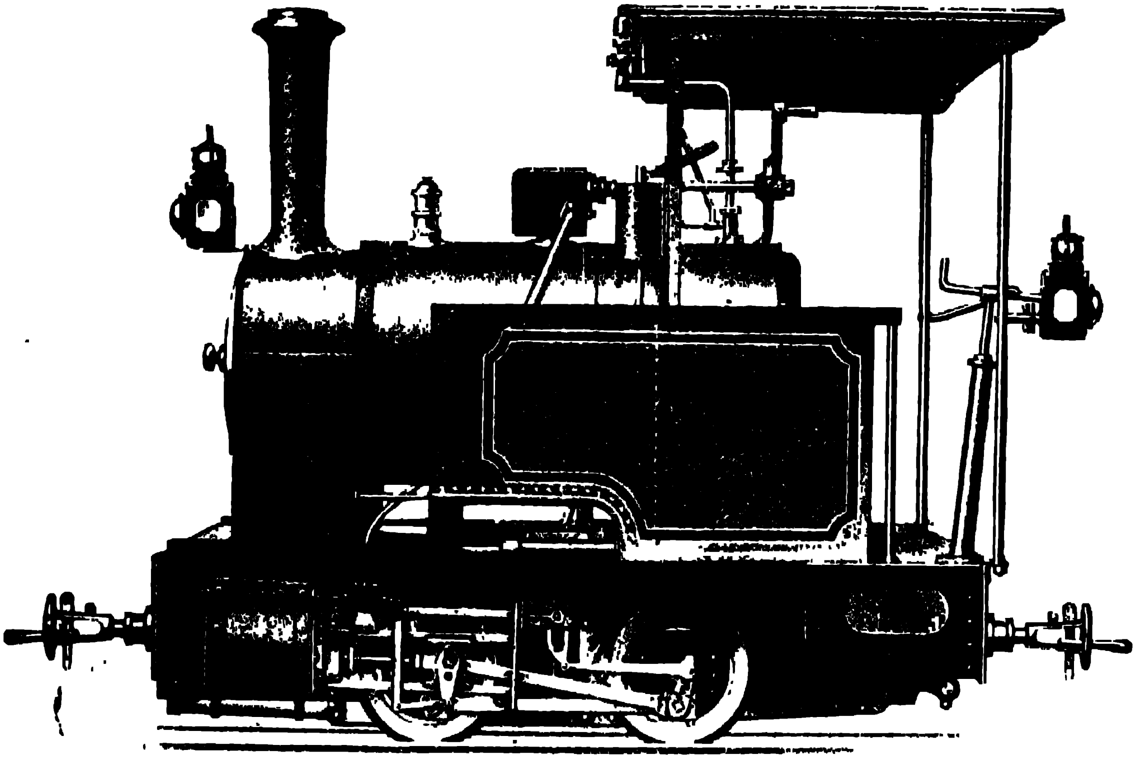
CALCUTTA, JAMSHEDPUR.
DELHI, LUCKNOW,

JESSOP & Co. LTD

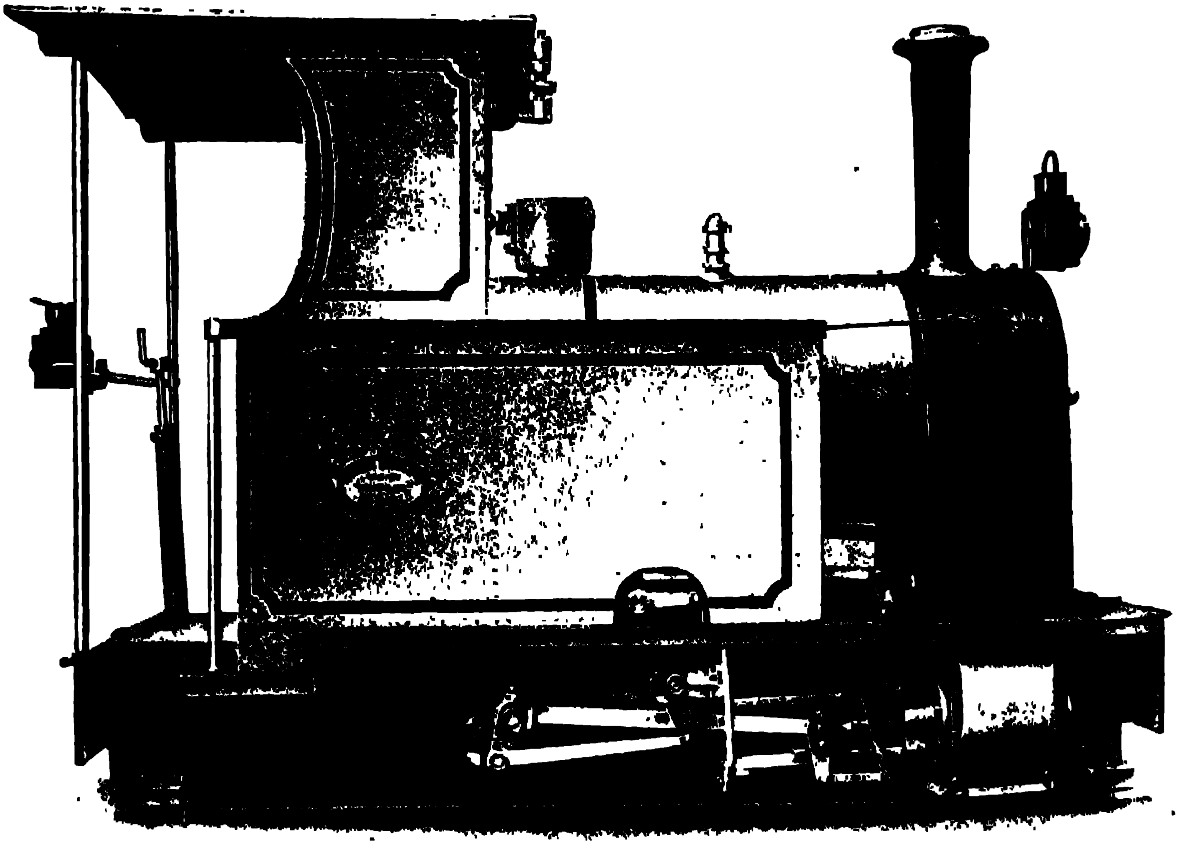
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Avonside Narrow Gauge Locomotives.



Class N.A. 6 by 10 ins. Outside Cylinders. Side Tank Locomotive Engine for 1 ft. 6 ins. to 2 ft. 6 ins. gauge.



Class N.C. 7 by 10 ins. Outside Cylinders Side Tank Locomotive Engine for 2 ft. to 3 ft. gauge.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Avonside Narrow Gauge Locomotives.

Illustrations show two types of Side Tank Locomotive Engines of the Outside Cylinder class for narrow gauge railways, main details of which are generally as those given on the previous The 6 by 10 ins. Locomotive is commonly designated a 20 H.P. size by colliery users.

Class N.A. 6 by 10 ins., Type 0-4-0, Side Tank Locomotive.

Gauge 1 ft. 6 ins. to 2 ft. 6 ins.

Cylinders, Diameter		6"	Weight of Engine, Empty	tons	5½
Stroke		10"	" Full	"	6
Working Pressure	lbs. per sq. in.	150	Minimum Weight of Rail per yard	lbs.	16
Diameter of Coupled Wheels	..	1' 8"	Sharpest Curve	feet	15
Coupled Wheelbase	..	3' 0"	Tractive Effort at 80% B.P.	lbs.	2,160
Total Wheelbase		3' 0"	Locomotive will Haul up on 1 in 30	tons	24
Total Heating Surface	sq. ft.	103	" " " 1 " 50	"	30
Grate Area	"	4	" " " 1 " 75	"	42
Tank Capacity	gallons	100	" " " 1 " 100	"	54
Bunker Capacity	cwt.	4	" " on Level	"	171

Price, as illustrated, with Copper Fire box, **Rs. 14,700.** With Steel Fire box, **Rs. 14,055.**

Class N.C. 7 by 10 ins., Type 0-4-0, Side Tank Locomotive.

Gauge 2 ft. 0 in. to 3 ft. 0 in.

(Generally designated a 30 H.P. Locomotive.)

Cylinders, Diameter		7"	Weight of Engine, Empty	tons	5¾
Stroke		10"	" Full	"	7
Working Pressure	lbs. per sq. in.	160	Minimum Weight of Rail per yard	lbs.	18
Diameter of Coupled Wheels		1' 8"	Sharpest Curve	feet	20
Coupled Wheelbase		3' 6"	Tractive Effort at 80% B.P.	lbs.	3,136
Total Wheelbase		3' 6"	Locomotive will Haul up on 1 in 40	tons	38
Total Heating Surface	sq. ft.	148	" " " 1 " 50	"	43
Grate Area	"	4½	" " " 1 " 75	"	61
Tank Capacity	gallons	120	" " " 1 " 100	"	79
Bunker Capacity	cwts.	5	" " on Level	"	203

Price, as illustrated, with Copper Fire box, **Rs. 17,550.** With Steel Fire box, **Rs. 16,850.**

Detailed specifications on application.

General information required for Locomotive enquiries.—

1. Limit of height and width of Engine together with loading gauge.
2. Steepest grade and length of same, also state if on curve and the radius in feet of same.
3. Smallest radius of line in feet.
4. Load in tons the engine has to take up the steepest grade and round the smallest curve.
5. State if the load must be started on an incline.
6. Weight of rails per yard and distance of the sleepers apart.
7. Greatest distance between water and coaling stations.
8. Kind of fuel to be used.
9. Give particulars of climate, and the conditions under which the engine will work. State if sandy or not.
10. Average speed required.
11. Particulars of buffer and draw-gear with heights of centres above the top of rail.
12. Rail gauge.
13. Give the heaviest weight allowable for packing.
14. Any other particulars that may be of service in designing engines.

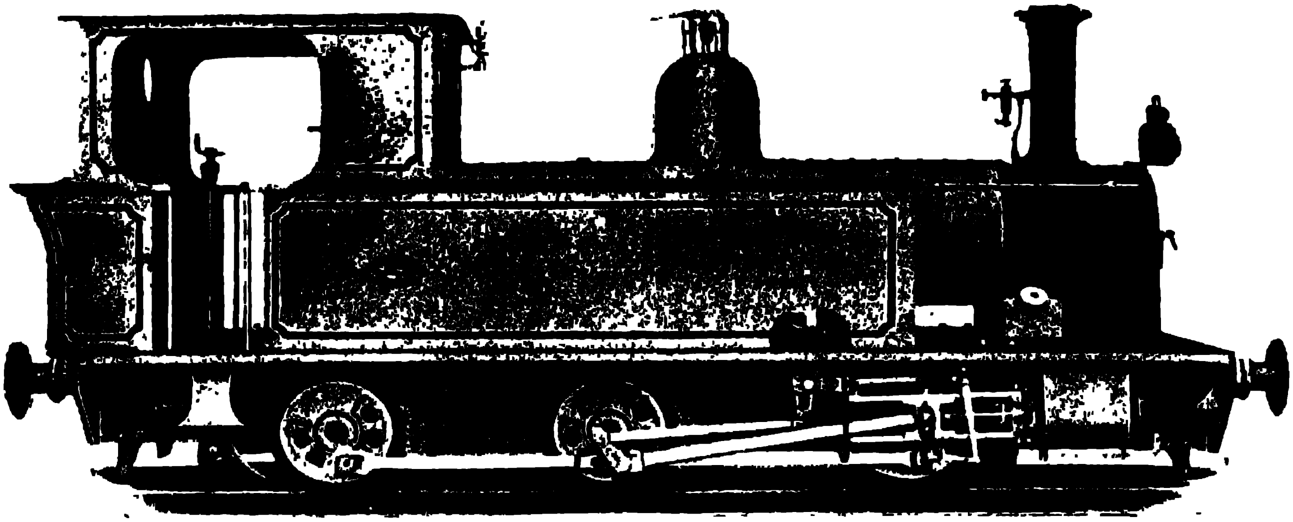
It is of great importance that full particulars should be supplied to enable a suitable type of Locomotive to be offered.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Avonside Locomotives.



Class N.J. (Type 0-6-0) 9¾ by 14 ins. Outside Cylinders, Side Tank Locomotive Engine for 2 ft. to 3 ft. 6 ins. gauge.

General Notes on Locomotive Practice.

Tractive Force.—Satisfactory results depend upon the tractive force and the weight on the coupled wheels of a locomotive being properly proportioned. Thus, if the weight be too small the locomotive is over-cylindered and the wheels will slip too easily. If the weight be too great the engine is under cylindered, which means so much dead weight to be moved about without any advantage to the engine. In adjusting the best proportion of tractive force and weight due regard has to be paid to the character of work for which the engine is intended.

Tractive Force for locomotives with two equal cylinders is given by the following formula :—

$T = \frac{d\,pl}{D}$ where

d = diam of cylinders in inches
l = length of stroke of piston in inches
D = diam of driving wheels in inches
p = mean effective pressure on pistons in lbs. per sq. in.
T = Tractive force in lbs. neglecting the work done in moving the engine itself

The actual pull at the draw-bar is given by :—

$T_1 = eT - WR$ where

T_1 = actual pull at the draw-bar in lbs.
e = mechanical efficiency of the engine.
W = weight of engine in tons.
R = resistance to motion of engine, regarded as part of the train in lbs. per ton.

The resistance (R) of a train on a straight level is :—

$R = \frac{V^2}{240} + 6$ where

V = speed of train, in miles per hour.
R = resistance of train alone, in lbs. per ton.

And the resistance due to gravity on inclines is :—

$G = \pm \frac{2240h}{5280} = \pm \frac{14}{33}h$ where

h = rise of incline in feet per mile.
G = resistance to traction due to gravity alone in lbs. per ton.

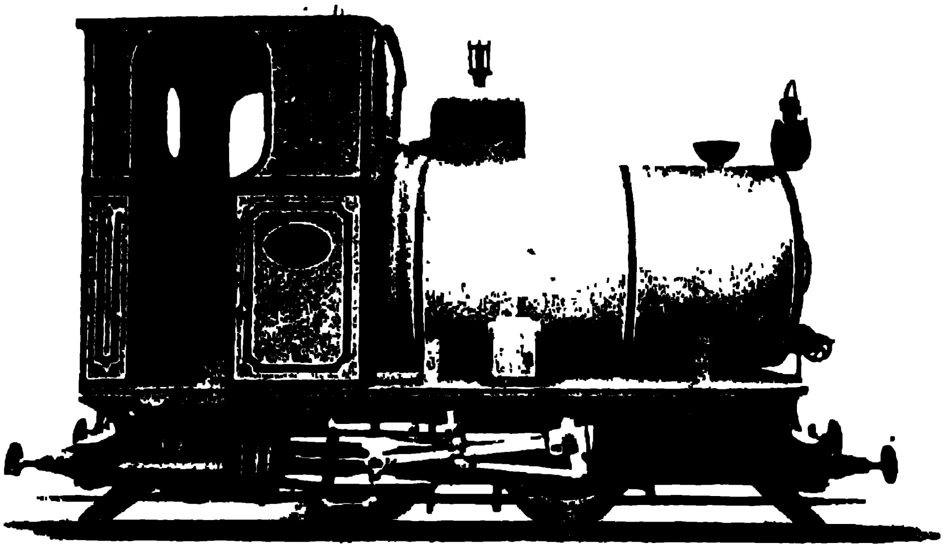
The plus sign to be taken when ascending, and the minus sign when descending.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Fireless Steam Shunting Locomotive.



The illustration shows the general style of a Fireless Steam Shunting Locomotive with four coupled wheels and outside cylinders.

The Fireless Locomotive may be regarded as an accumulator engine, which receives steam to drive an otherwise ordinary locomotive from a heat reservoir containing water heated to much above the atmospheric boiling point.

As soon as the throttle is opened to admit steam to the cylinders, the pressure in the storage boiler commences to fall, which causes steam to be given off with which to drive the engine. As no firing is provided it follows that the engine must run with a constantly decreasing pressure and will continue to do so until a pressure is reached at which no more steam can be generated, thus necessitating re-charging with live steam at intervals depending upon the loads to which the engine is subjected, *i.e.*, suppose an engine delivers work equivalent to 20 H.P. for a period of one hour, then the same engine would also be capable of 10 H.P. for 2 hours or 40 H.P. for ½ an hour.

The above illustration is of a metre gauge locomotive and the following are some of its leading dimensions, etc :—

Cylinders, diameter		8"	Tank Capacity, cu. ft		81
" stroke		11"	Steam space capacity, cu. ft		27
Working pressure	lbs. per sq. in.	160	Weight of Engine, empty	tons	7¾
Dia. of coupled wheels		1' 11"	" " " full	"	10
Coupled wheelbase		4' 7"	Tractive effort at 70% cut off	lbs	4,575
Total wheelbase		4' 7"			

Detailed specifications on application.

General information required for Fireless Locomotive enquiries :—

1 Rail gauge, weight of rails per yard and distance of sleepers apart.
2 Load engine has to take up steepest grade and round smallest curves.
3 Steepest grade and length of same.
4 Smallest radius of line.
5 Particulars of buffer and draw-gear with heights of centres above top of rail.
6 Calculated daily capacity.
7. Intermittent or continuous work.
8 Maximum pressure of stationary feed boiler, stating type and heating surface.

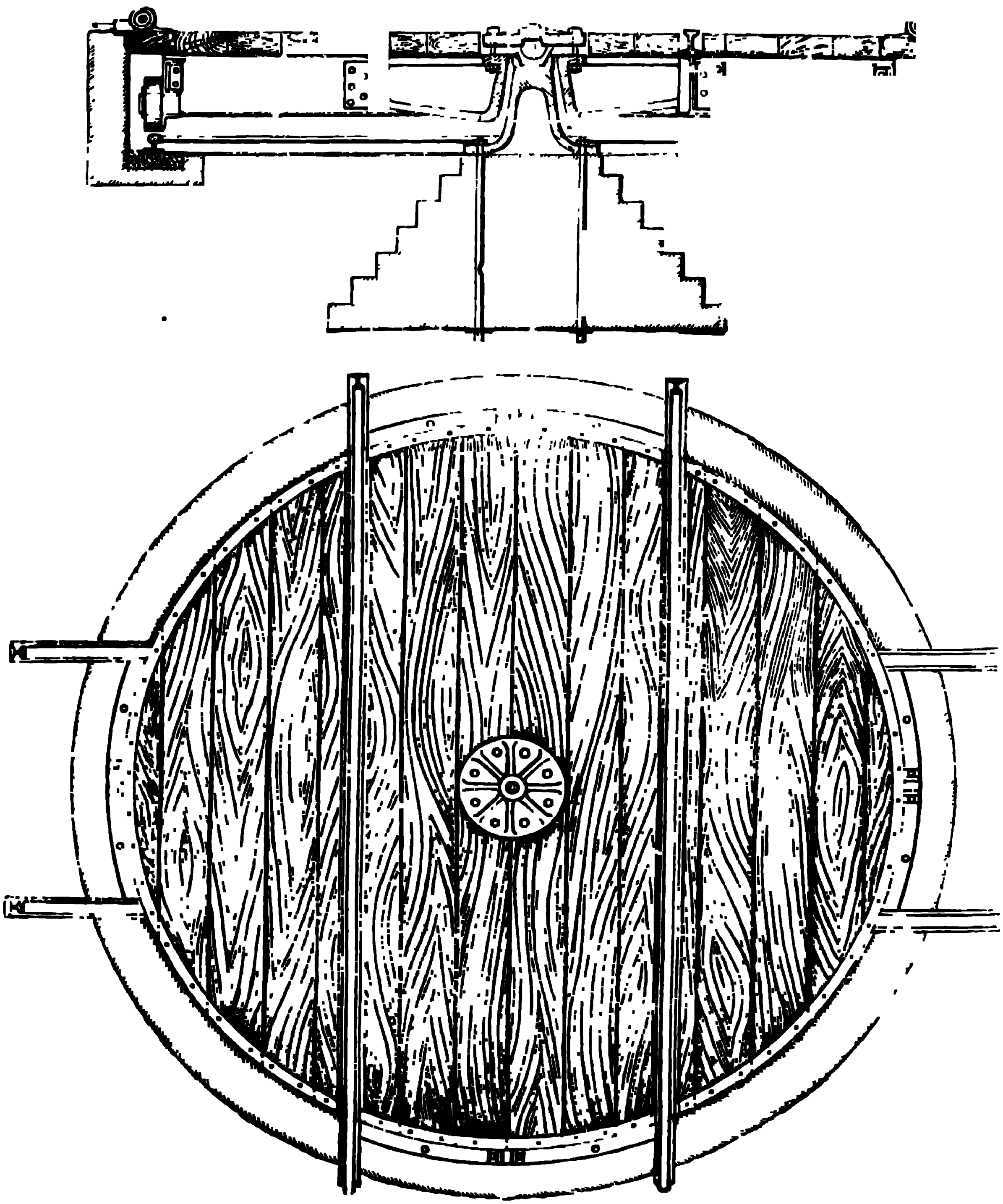
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Turntables.

Built up of Rolled Steel Joists.



The above illustrates a Turntable, 20 feet diameter, several of which have been made by us for Main Line Wagons.

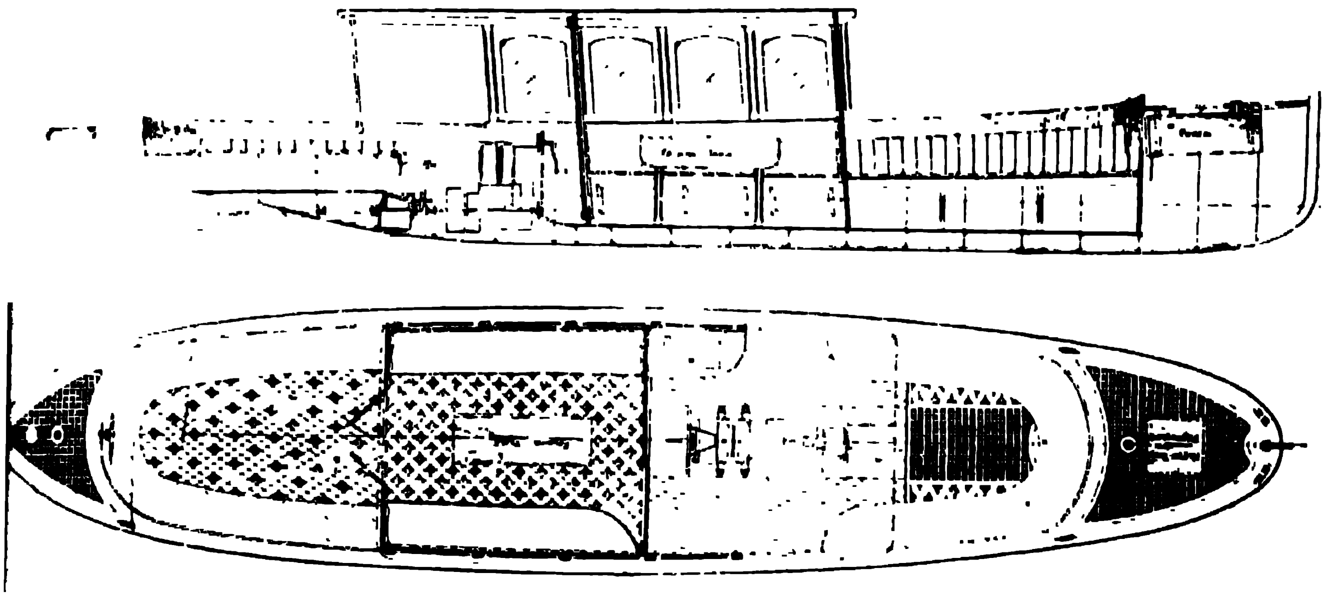
Prices of this and other sizes on application.

CALCUTTA JAMSHEDPUR,
DELHI LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Motor Launches.



We shall be pleased to quote for Motor Launches suitable for use on Indian rivers on [illegible] full particulars of requirements

We illustrate above one of the many types we can supply and in the table below give [illegible] of a few of the usual sizes made. The Launches can be supplied with Engines working with either Petrol or Paraffin, and are fitted with approved necessary gear

	20 feet	25 feet	30 feet	35 feet
	5' 6"			6' 0"
	17"	17"		18"
[illegible] Approx. Miles per hour			9[illegible] 11	14
[illegible] Capacity No. of persons		12		14

In cases where Launches are required for special work, we require the following [illegible] to enable us to quote.

(1) Seating capacity.

(2) Weight to be carried exclusive of passengers.

(3) Speed in miles per hour

(4) Maximum draft permissible.

(5) Whether to be fitted with cabin (as illustrated above) or awning.

We can supply open type Launches with or without cabins having Galvanized Steel Hull with water-tight compartments to prevent sinking. These Hulls are less expensive and [illegible] less than any other and do not leak or oxidize. No caulking is required.

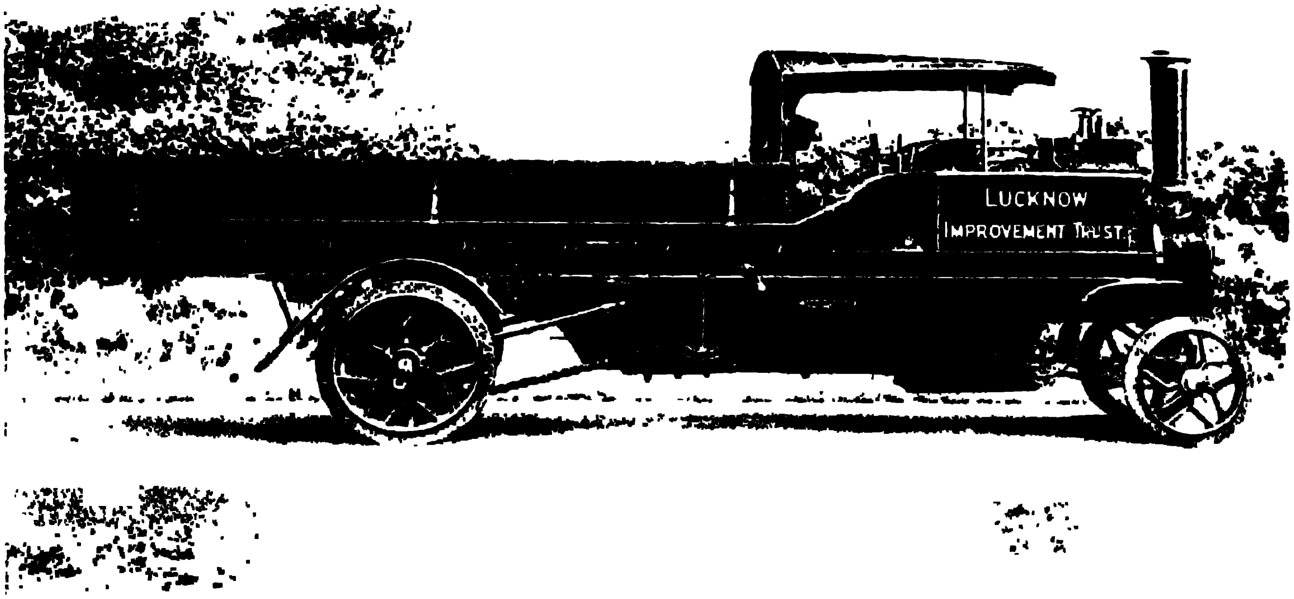
We can also quote for Steam Lunches and Stern Wheel Ferry Steamers on receipt of the above particulars

CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEE

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Foden" Steam Wagon.



Mechanical Transport is now generally recognised to be the cheapest as well as the most expeditious type of transport, even in India, as is proved by its ever increasing adoption. What has obtained relatively little consideration is the comparative advantages of the different forms of mechanical transport and particularly the relative merits of Petrol and **Steam Vehicles.**

The rapid headway which the petrol motor has made in India during the last fifteen years has led many people to suppose that for commercial purposes the petrol-driven wagon is the only satisfactory type of road vehicle. Notwithstanding the knowledge that the life of a car is comparatively short and its upkeep heavy, it has been assumed that the same type of vehicle is equally suited to the very much heavier loads and rougher usage which is inseparable from commercial transport services.

In the British Isles—in spite of the exceedingly high price of coal—the Steam Wagon is generally adopted for most heavy transport services. The large fleets of privately-owned steam wagons, which are still being continually added to, indicate that steam transport offer substantial advantages to users. In India—as we hope to show—these advantages are equally capable of being realised.

Foden Facts.

Fodens, Ltd., were the pioneer builders of steam wagons. The Foden is still the known and most widely used type.

The Foden Steam Wagon has been adopted by 115 British Public Bodies representing nearly 300 Municipal and similar vehicles supplied. Numbers of Corporations and Councils have ten or more Foden Wagons in use, one alone—the Northumberland County Council owns 28 Fodens.

Foden Wagons in India.

The following are some of the users of Foden Wagons in India :—

Delhi Imperial City, P.W.D.
Motor Transport Workshops, Chaklala.
Executive Engineer, Special Imperial Division, Dehra Dun.
Bangalore Municipality.
Lucknow Improvement Trust.
Executive Engineer, Sheikhurpur Provincial Division
Chief Engineer, Oudh and Rohilkhand Railway.
District Engineer, Mirzapur.
Indian Steels, Ltd.
Executive Engineer, Amballa Provincial Division.
Forest Engineer, Dharwar.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Foden" Steam Wagon.

The "Foden" Wagon can rightly claim to be the pioneer of steam road vehicles, since it first made its appearance and demonstrated its utility in the War Office Trials of 1901. Since then it has been produced in ever increasing numbers, and it is testimony to its sound design and workmanship, that numbers of the early vehicles are still in commission at the present day. During the War the Foden Works were solely occupied in the production of steam wagons for military requirements and Messrs. Fodens, Ltd., were advised by the War Office that, had their production been equal to the demand, no other make of vehicle would have been ordered.

We claim the following advantages for the "Foden" Steam Wagon:—

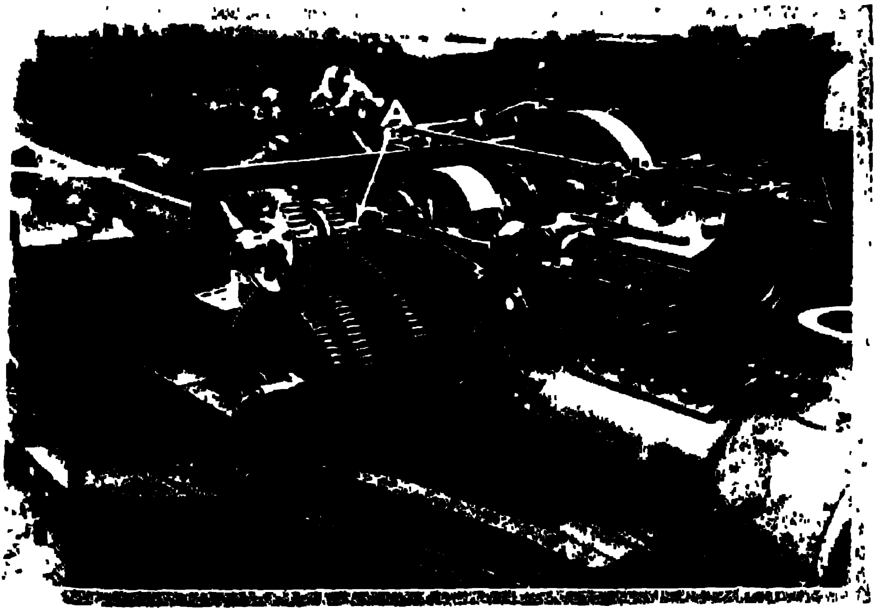
(1) **A simpler mechanism, accessible in every way and of a type with which every Indian mechanic or driver is familiar.**

(2) **Large reserve of power for hauling exceptional loads or negotiating heavy gradients.**

(3) **Three speed change gear can be supplied to give 4, 8 and 12 M.P.H.**

(4) **Exceptionally low operating costs and moderate upkeep charges.**

(5) **The strongest construction and the longest life of any type of road wagon.**



Simplicity.

The Foden mechanism is essentially the same in form as that of the steam road roller, which is familiar to most Indian drivers. The keynote of the design is strength, simplicity and accessibility. The engine has few parts and the motion is always in view of the driver.

The illustration shows the transmission arranged for three speeds. The low speed pinion is located at A just behind the second speed.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Foden" Steam Wagon.

Low Operating Costs.

In a paper read before the Institution of Mechanical Engineers in 1920, an interesting analysis is given of the working costs of 100 steam and 100 petrol vehicles. The figures are taken from users' records and prove conclusively that steam wagon costs average 50 per cent less than those of petrol wagons.

In India the relative cost of coal or petrol is practically the same as in Great Britain and the same advantages are therefore obtainable. Each particular case should, of course, be examined on its own merits, and it is possible for all users to make an intelligent comparison between the two rival types. As fuel costs bulk largest in total running costs, they are generally the determining factor.

Durability.

Economy in the working charges of a Lorry will be valueless if it is not accompanied by the assurance that the life of the vehicle will be as long as any other. In this respect the Foden Steam Wagon can speak for itself. We can refer to Foden Municipal Wagons which have been at work for twenty years and are still in commission, while numerous users testify that Foden Wagons purchased ten and more years ago are still giving satisfactory daily service. A single inspection of a Foden will convince buyers that it is made to last, and a perusal of the large number of testimonials received from users will prove that it *does* last.

Reserve of Power.

The Foden is driven by a compound steam engine. Under normal conditions the steam after passing through the high pressure cylinder continues its expansion in the second or low pressure cylinder but, when necessary, high pressure steam can be admitted to both cylinders thereby more than doubling the power developed. For starting with heavy loads or working up steep inclines this provides an abundant reserve of power and prevents over-straining of the engine which might result if the same thing was attempted with other types of motor

We shall be very pleased to give you an estimate for a Foden to suit any particular case with detailed information on running costs, on receipt of a reply to the following questions:—

(1) Nature of load to be hauled.
(2) Whether any special type of body preferred.
(3) If tipping body, whether side or end-tip
(4) Weight of each load.
(5) Whether loads in both directions may be expected.
(6) Local price for good steam coal, coke or charcoal. (The local price of petrol may also be quoted for the sake of comparison)
(7) Distance load has to be handled.
(8) Whether trailers can also be used.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEE

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Foden" Steam Wagon.

Types of Wagons.—The Foden can be supplied for 3, 5 and 6 tons carrying capacity, with either fixed side tipping, end tipping, or three-way tipping bodies, or as a six-wheeler to carry 12 tons, as shown above or as a tractor.

Spare Parts.—A point of much interest to the user is the question of spares and we carry in stock in India a considerable quantity of replacements to cover all ordinary requirements.

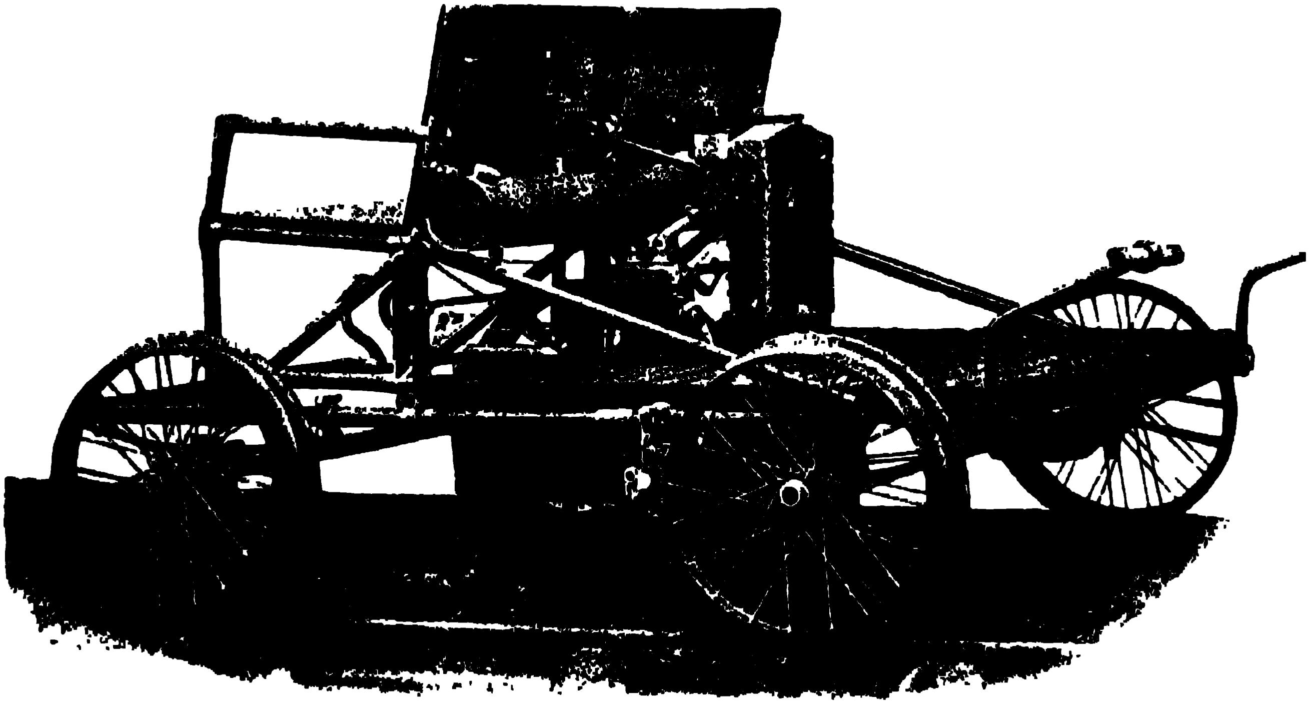
If you are interested in Mechanical Transport write to us for a fully illustrated list showing the types of vehicles and bodies which can be supplied.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Trollies.



White's Patent Improved Motor Trolley.

This Trolley has been especially designed for the use of District, Resident, Signal and Assistant Engineers, Traffic Officers, Block, Signal and Permanent-way Inspectors, etc., who require a rapid means of transportation between places at considerable distances apart or have lengthy sections of lines to inspect at frequent intervals.

The Trolley is of moderate weight: four strong coolies can quickly lift it off the line, with the wheels and axles intact, or, by drawing out four bearing pins (the work of a moment), the Trolley can be lifted off the wheels and axles, the machinery still remaining self-contained.

The Frame.—The frame work is made of high grade steel tubing: the joints being brazed and pinned. This frame has been tested to fully twice the load it is designed to carry, *viz.*, two officers and four trolley coolies.

The Engine.—The Trolley is fitted with a Precision Engine, which is sufficiently powerful to maintain a speed of 30 miles per hour on the level with a full load. Ignition is by Magneto.

General.—A powerful Foot-brake is fitted. The Control is simple and elastic giving speeds of two to thirty miles per hour. The wheels are of pressed steel, but wire wheels are now under trial.

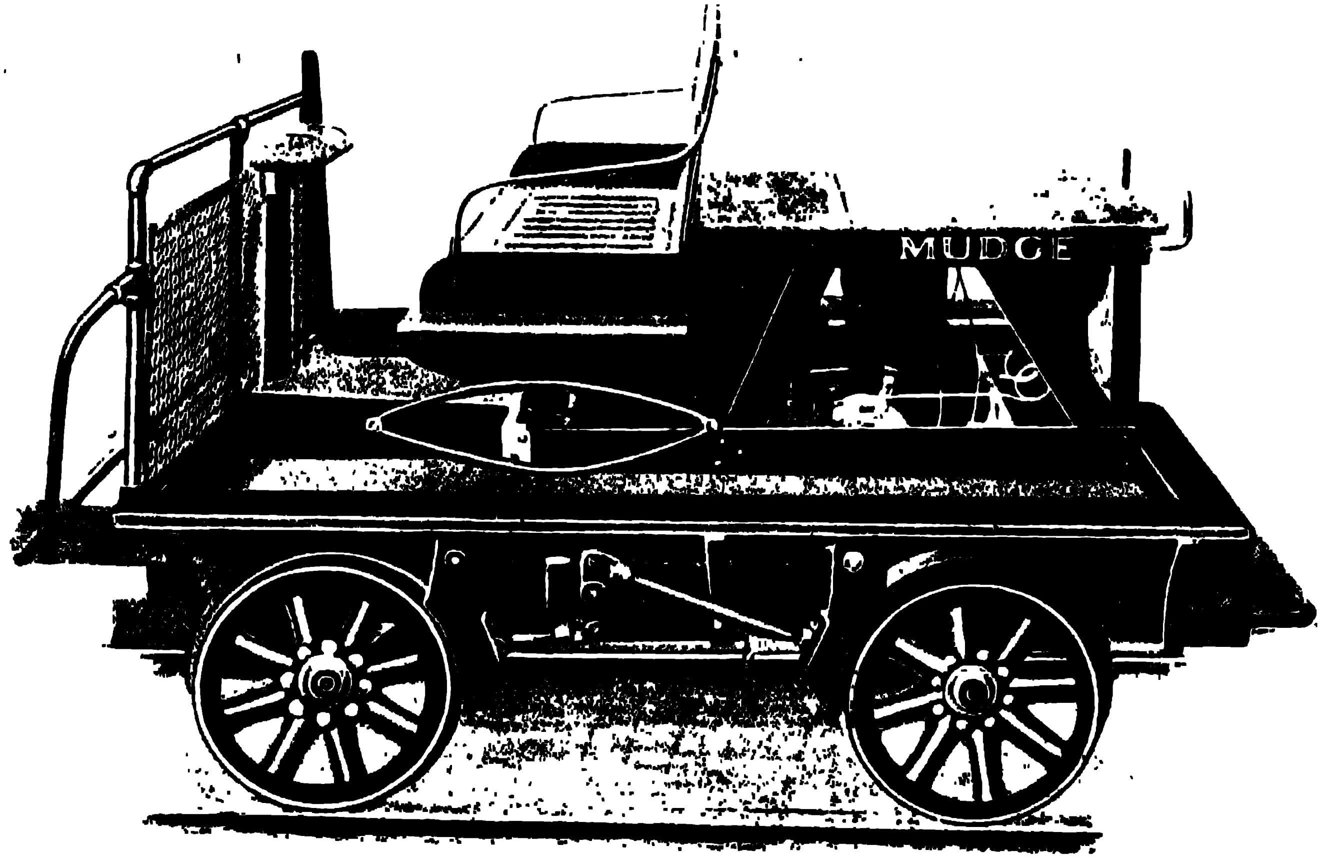
These Trollies can be made to suit all gauges and gradients and we shall be pleased to furnish detail estimates on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Railway Trollies.



Mudge Motor Trolley. Class ES3.

4 or 8 H.P. at will of Operator, Weight 1,050 lbs.

For all ordinary inspection service the Mudge Trolley will be found the ideal type. It can carry ten men and hauls a loaded trailer with comparative ease

This Trolley has a twin power plant using two Standard Mudge Engines, two cycle, air cooled, each fitted with a Mudge Auto-Carburetter and set of control levers for independent operation, both engine being used as added power is needed.

Power is transmitted to the axle through machine cut case hardened steel gears constantly in mesh and are adequately guarded and dust-proof.

The weight is evenly distributed so as to make the trolley easy to handle on or off the track.

The frame is of best selected tough cane ash with steel sub frames to carry the engines and is built to suit any gauge of track.

Complete specification and estimates furnished on request.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

SULLIVAN MACHINERY COMPANY.

CHICAGO, Illinois, U.S.A.

Works:—Claremont N.H. **Michigan City, Ind.**

Foreign Branches:

Algiers; Calcutta, India; **Paris; Santiago, Chile; Shanghai;**
Christiania, Norway; London; **Sydney, N.S.W.; Tokyo; Toronto;**
Madrid; Manilla; Nelson, B.C. **Tunis, Africa; Turin, Italy; Vancouver, B.C**

ANNOUNCEMENT.

WE take great pleasure in announcing to our clients that we have been appointed Agents for the **Sullivan Machinery Company** of **Chicago** for India and Burma

In our business dealings of the past years we have built up a clientele and reputation of which we are justly proud, and which we feel should be preserved at all costs. In recommending the products of any one company we are assuming a grave responsibility, and it follows that if we did not believe in it we should not be sponsoring it. We have gone into the matter with a great deal of care, and are satisfied that we could not find better equipment than what we are offering.

The **Sullivan Machinery Company** are pioneers in the manufacture of rock working an pneumatic machinery, and have been a decided factor in the development of the present day mining and quarrying equipment. They put the first continuous chain undercutting coal machine on the market and their present machine embodies a number of features found in no other design. Their popularity in the United Kingdom, South Africa, Australia, Canada, Malay States, India and other countries is ample proof of correct design and honest workmanship.

The **Sullivan** air compressors range from 60 to 5,000 cu. ft. capacity, belt or steam driven or direct connected and with a pressure range of 20 to 500 pounds per square inch.

There is a **Sullivan** rock drill for every condition, from the "**Rotator**" (29 pounds) to the 600 pound steam tripod drill.

In Diamond Drills, of which they are one of the oldest, and best known manufacturers buyers have the choice from the "**Bravo Hand Power Diamond Drill,**" with a capacity of a one and one half inch hole to 500 feet; and which can be carried by coolies, to the "FK" type steam driven, with a capacity of a four and one half inch hole up to 6,000 feet.

Air Lift Pumping is another department to which we would direct attention. Enormous strides have been made in this branch of engineering during the past ten years, and our **Air Lift Pumping Department** will be pleased to advise buyers.

Among other equipment manufactured by the **Sullivan Machinery Company** are:—

Vacuum Pumps, Displacement Pumps, Drill Steel Sharpeners, Cutterbit Sharpeners. Electric and Turbinair Hoists (single and double drum), Drill Furnaces, etc.

It has been impossible for us to cover the field completely in the limited space at our disposal, and we would ask buyers in particular instances to write to us for further details

Our regular staff of engineers has been augmented by members of the **Sullivan** organisation who are at your service. In addition to this we carry a complete line of spare parts and machines, and we are in a position to give the best of service.

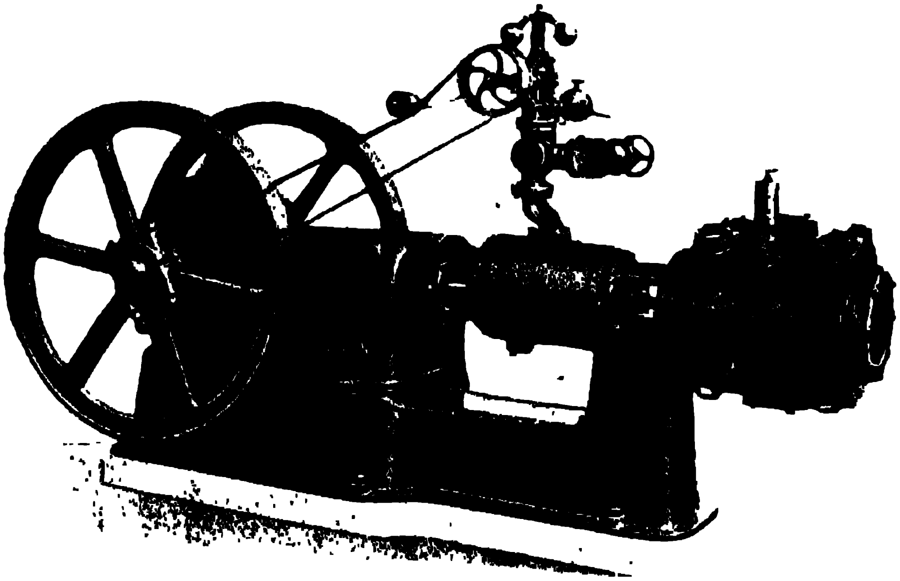
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Straight Line Single Stage Steam Driven Air Compressor.

Type "WA-6."



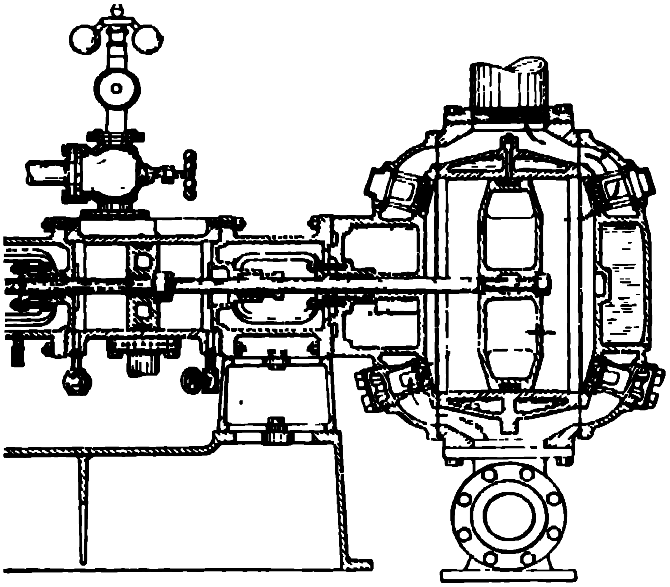
For the purchaser who is looking for a small, reliable steam driven Compressor the **Sullivan "WA-6"** presents a combination of attractive features seldom found in a machine of this class and price.

The object kept in mind by the designers and carried through every stage of manufacture has been to produce a machine which will operate from year end to year end; which will be simple, compact, require the minimum of care and attendance, and be as efficient as a machine of this small size may be expected to be.

For details write for Bulletin No. 377-C.

Size.		Displacement. Cu. Ft	Air Pressure 90 lbs. Steam.	I. H. P.	Price.
Steam.	Air.				
					Rs.
7 × 8	8 × 8	139	120	23·5	4,920
7 × 8	9 × 8	176	100	26·5	5,200
7 × 8	10 × 8	218	50	26	5,375
7 × 18	12 × 8	314	30	30·	5,785
9 × 10	10 × 10	236	120	37	6,355
9 × 10	11 × 10	286	100	51·	6,000
9 × 10	12 × 10	340	100	56·	6,910
9 × 10	14 × 10	463	50	58·	7,280
9 × 10	17 × 10	684	30	70·	8,405
11 × 12	12 × 12	377	120	70·	8,815
11 × 12	14 × 12	513	90	92·	9,475
11 × 12	16 × 12	670	50	88·	10,250

Sullivan Single Cylinder Dry Vacuum Pumps.



Types "WA-61" and "WG-61."

For Vacuum pumps of larger displacement see "WI-61," page 401.

Sectional view showing cylinder construction of "WA-61" and "WG-61."

Steam Driven Type "WA-61."

Size Cyl. Air.	Size Cyl. Steam.	Displacement per Min.	I. H. P. at Peak Load Atmp. Disc.	Price.
				Rs.
7×8	18×8	610	24	**6,150**
9×10	22×10	1032	41	**8,200**
11×12	21×12	1058	42	**9,020**
11×12	26×12	1620	65	**10,170**

These pumps will produce a vacuum on closed suction of 97 per cent. of the barometric reading.

General specifications similar to those of the "WA-6" see preceding page, or write for **Bulletin 378-A.**

Belt Driven Type "WG-61."

Size Cyl.	Displacement per Min.	I. H. P. at Peak Load Atmp. Disc.	Price.
			Rs.
14×6	320	13	**2,700**
18×8	610	24	**3,775**
22×10	1032	41	**5,300**
21×12	1058	42	**5,775**
26×12	1620	65	**6,750**

These pumps will produce a vacuum on closed suction of 97 per cent. of the barometric reading.

General specifications similar to those of "WG-6" see opposite page, or write for **Bulletin 378-A.**

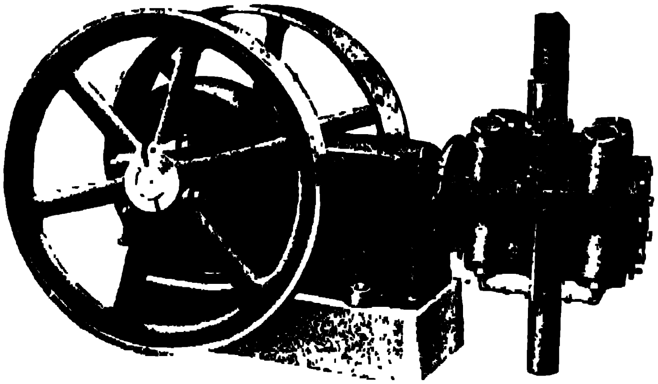
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Belt Driven Air Compressor.

Type "WG-6."



In these compressors ranging in capacity from 68 to 684 cu. ft. per minute, for standard pressures, reliability and continuous service have been held as the prime objects to be attained in design and construction. Simplicity, compactness, power economy, a minimum of care and attention and moderate price are other desirable features of these machines.

For further details write for Bulletin No. 377-E.

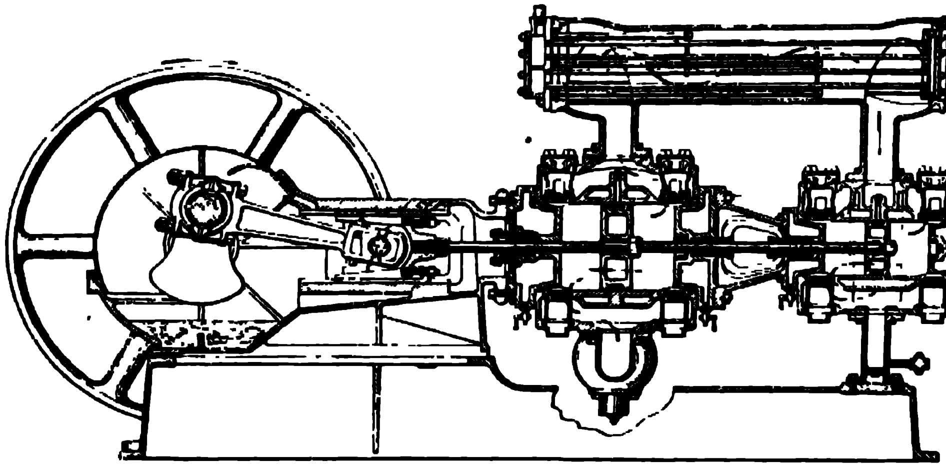
Size Cyl. Air.	Displacement per Min.	Max. Working Pressure	H. P. this Pressure	Price.
				Rs.
6×6	68 cu. ft	120	10·5	**1,550**
*7×6	93 ,,	100	12·5	**1,630**
8×6	122 ,,	50	14·	**1,740**
10×6	191 ,,	35	19·	**2,000**
*8×8	139 ,,	120	22·5	**2,275**
*9×8	176 ,,	100	25·	**2,500**
*10×8	218 ,,	50	25·5	**2,665**
12×8	314 ,,	35	32	**3,000**
*10×10	236 ,,	120	38·	**3,425**
*11×10	286 ,,	100	45·7	**3,610**
12×10	340 ,,	100	53·8	**3,815**
14×10	463 ,,	50	57·5	**4,100**
17×10	684 ,,	35	72·	**5,200**
12×12	377 ,,	120	67·	**4,960**
14×12	513 ,,	100	90·	**5,330**
16×12	670 ,,	50	87·	**6,220**

* Hopper jackets furnished **Rs. 100** extra.

Belt Idler prices on application.

Sullivan Straight Line Two Stage Belt-Driven Air Compressor.

Type "WH-6."



Sectional View of Sullivan "WH-6" Air Compressor.

Cylinder Sizes		Displacement per Min.	Air Press. Pounds.	H.P. at 100 lbs.	Price.
Low.	High.				
					Rs.
12×10	7¼×10	340	100	59·2	6,100
14×10	8½×10	441	100	75·3	7,500

Belt Idler, Force Feed Lubricator prices furnished on application.

For further details write for Bulletin No. 377-G.

The Sullivan Class "WH-6" Two Stage, Belt-driven Compressor is similar in design and construction to the "WG-6," single stage machines described on the foregoing page. The air is compressed in two stages, however, instead of at one operation, with the attendant advantages in power economy and in better distribution of the load and of working strains than is possible in a single stage compressor of the capacity in question.

The frame, low pressure cylinder, working parts and methods of lubrication are all similar to those of the single stage machines. To the rear end of the low pressure cylinder is fastened a distance piece, carrying the high pressure cylinder. The intercooler is mounted above the two air cylinders, and the entire compressor is bolted securely to a substantial iron sub-base, making it entirely self-contained, and keeping all parts in exact alignment.

The intercooler is provided with aluminium tubes, through which cooling water circulates. The ends of the tubes are expanded into cast-iron headers, the outer header being bolted against a packed joint on the outer end of the intercooler shell, and the inner header being left free to move with the expansion and contraction of the tubes. The whole nest of tubes is removable from the shell for inspection or repair. Baffle plates are placed in the intercooler, to force the air to pass across the cold tubes several times on its way from the intake to the discharge cylinder.

The cooling water first passes upward through the jacket of the high-pressure cylinder, then upward through the jacket of the low-pressure cylinder, and after traversing the intercooler tubes, is discharged at the top of the intercooler.

Sight-feed lubricators are provided for both the air cylinders.

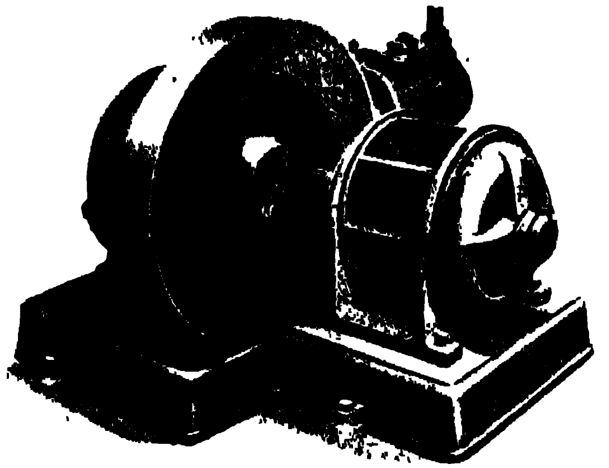
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Straight Line Single Stage Direct Connected Air Compressor.

Type "WK-6."



"WK-6" with Gear Cover Removed.

This compressor is of the centre-crank, straight line, single stage, splash lubricated type (see "WG-6"), with the following exceptions: There is but one square rim flywheel, located on the motor side of the compressor, and having an internal machine-cut gear meshing with the driving pinion on the motor shaft. The compressor and motor are both mounted on a substantial cast-iron base with planed bosses on which the compressor and motor rest, and adapted to be bolted to the foundation.

The outstanding feature of this construction is the fact that the drive gear is internal rather than external. This permits the use of a flywheel of ample diameter with the small gear diameters necessary for smooth running. The fact that the gear is not an integral part of the flywheel but is a separate part, makes the cost of replacement much less than if it were necessary to replace the entire wheel.

Size Air Cyl.	Displacement per Min. Cu. Ft.	Air Press., Pounds	H. P. this Press.	Price.
				Rs
6 × 6	58	100	10	5,000
7 × 6	80	100	15	5,650
8 × 6	101	60	15	5,875
8 × 8	121	100	20	6,540
9 × 8	152	100	25	7,500
10 × 8	188	50	25	7,700
10 × 10	213	100	40	9,840
11 × 10	258	100	40	10,875
12 × 10	307	70	40	11,110
14 × 10	374	40	40	11,375

*Hopper jacket furnished **Rs. 100** extra.

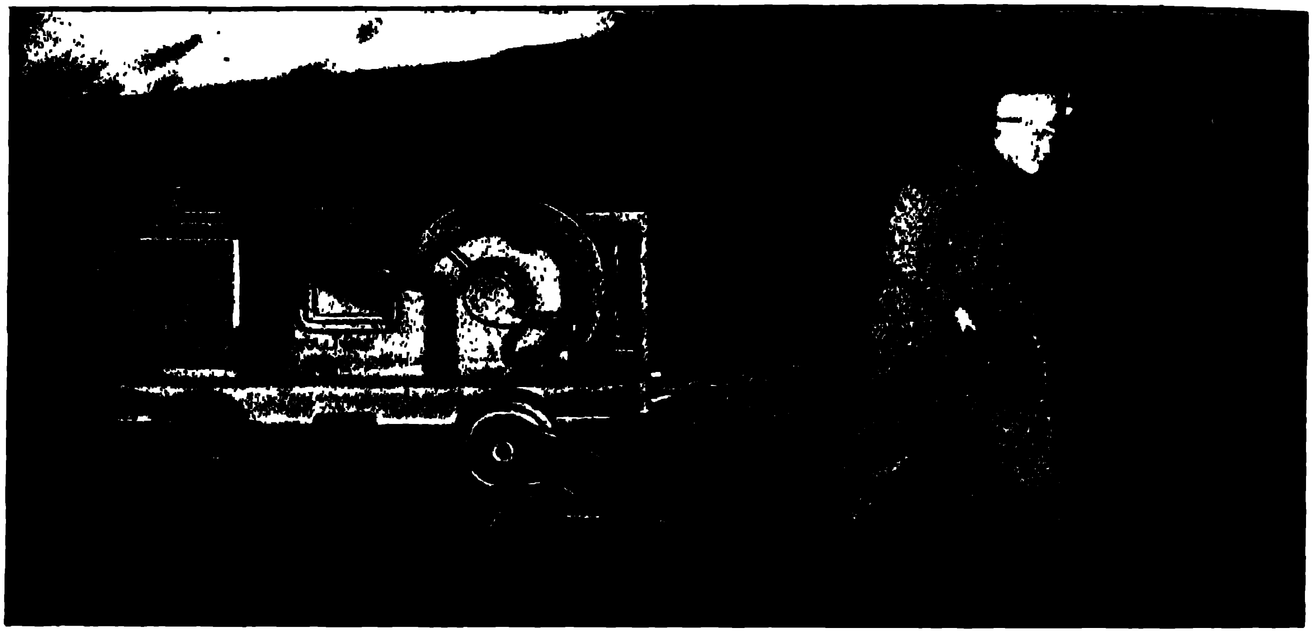
Motors.—A. C. motors, squirrel cage type, are furnished with a starter and no load release. D. C. motors are compound wound commutating pole type and are furnished with a starter.

Switches and fuses are not furnished with "WK" compressors.

For further details write for Bulletin No. 377-E.

Sullivan Portable Mine Car Motor-Driven Air Compressor.

Type "WK-26."



Introduced by the Sullivan Machinery Company these compact, complete, independent air power units have made a place for themselves. They are used chiefly underground in coal mines, where they are found a convenient means for converting electricity into air power for the operation of Rotator hammer drills, punchers, pneumatic picks, cement guns, etc. They are particularly useful in the removal of jama or dykes. The compressor is similar to the "WK-6" type (see page 393) with an internal gear drive direct from the motor pinion.

Size Air Cylinder.	Approx. Weight, Pounds.	Displacement, Cu. Ft. Per Min.	Air Press., Pounds.	H.P. at 100 lbs.	Overall Dimensions. Length.	Overall Dimensions. Width.	Price.
					Ft. Ins.	Ft. Ins.	Rs.
7× 6	3,400	93	100	15	6 4	4 3	**7,380**
9× 8	4,950	152	100	25	8 4	4 11	**9,500**
9× 8	4,625	123	100	20	8 4	4 9	**8,775**
10×10	8,050	213	100	40	9 5	5 0	**12,200**
11×10	8,400	258	100	40	9 5	5 0	**13,120**

Motors.—A. C. motors, squirrel cage type, complete with starter, no voltage release and overload relay. D. C. motors are compound wound, commutating pole type, with starter switch and fuses.

Standard track gauges for 6 ins. stroke 17 ins. to 48 ins inclusive.
" " " " " 8 " " 19 " " 50 " "
" " " " " 10 " " 20 " " 56½ " "

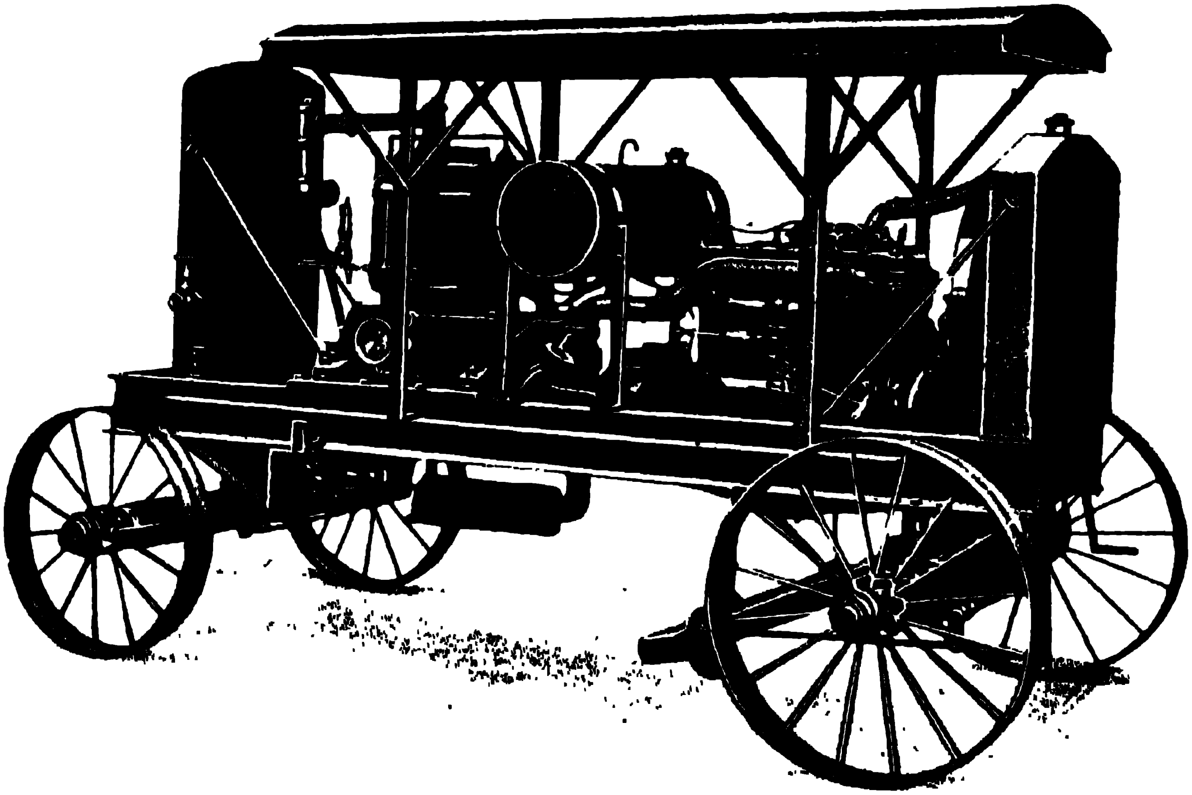
Unless otherwise ordered 10 ins. wheels with plain bearings not bushed will be furnished. Wheels with Hyatt roller bearings supplied at an additional charge of **Rs. 275-0.**

All air cylinders supplied with hopper jackets.

For further details write for Bulletin No. 377-I.

Sullivan Portable Petrol Engine-Driven Air Compressor.

Type "WK-311."



This compact self-contained unit is particularly adapted to road or construction work where it is not economical to install a permanent plant or where the work is so widely scattered that a central plant is not feasible.

It consists of a high speed (400 r.p.m.) two cylinder single acting compressor with a capacity of 150 cubic feet of air per minute and an air receiver, driven by a "Buda" four cylinder engine, all securely bolted to a 9-inch channel frame and mounted on wheels of ample diameter and face. Shipping weight, approximately, 5,425 pounds.

Price, Rs. 9,975-0.

For further particulars and details write for Bulletin No. 377-D.

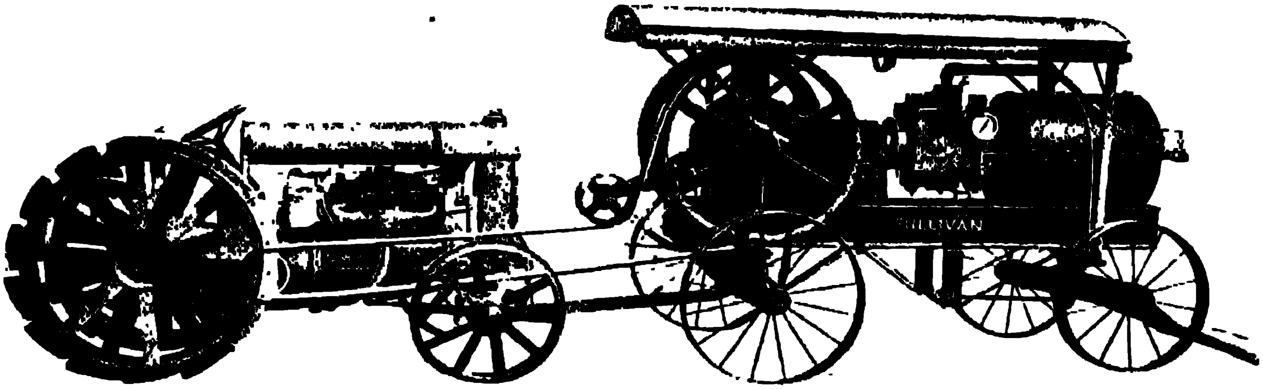
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Sullivan Portable Air Compressors.

Tractor Drive Type "WK-34" and Motor Drive Type "WK-32."

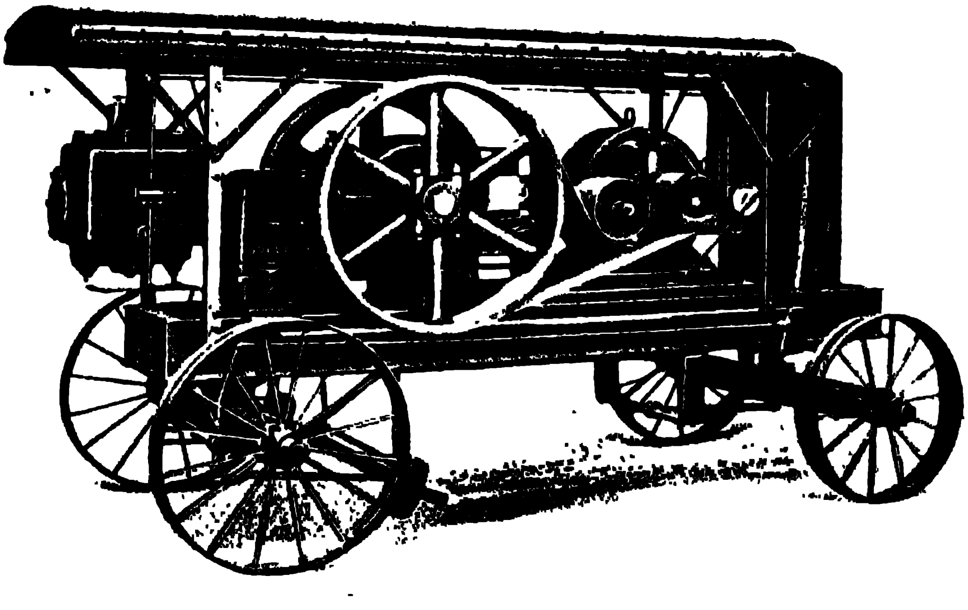


Sullivan "WK-34" Portable Air Compressor, with Tractor in Operating Position.

The Sullivan "WK-34" portable air compressor was designed to take advantage of the widespread use of tractors on contract work. Tractors perform so many useful tasks, either for hauling, or as prime movers to drive other machinery, that many road contractors and municipal or county departments are already equipped with one or more.

The "WK-34" compressor rig is made up of a standard, Sullivan straight line, single stage compressor, with idler pulley, mounted on a steel truck body, and connected to a horizontal steel plate air receiver set in rear of the air cylinder.

Sullivan "WK-32" Portable Motor-Driven Air Compressors.



When electric power is at hand, air for drilling rock or other construction jobs may be furnished by the "WK-32" type of Sullivan Portable compressor. This is similar to the "WK-34" tractor driven machine just described. But the truck carries an A. C. or D. C. electric motor, which runs the compressor through a compact short belt drive. The compressor is of the "WG-6" standard plate valve, splash oiled type, but hopper water jacket is furnished.

"WK-32" Compressors are built in three sizes, for displacement capacities of 121, [illegible] and 213 cubic feet.

Sullivan Air Compressors.

"WK-34."

Comp Size	Weight, Pounds.	Displacement Cu Ft	Term Press	Belt Speed.	Brake HP	Price.
						Rs.
8	4,100	121	90	2,725	18.3	5,000
9 × 8	4,300	152	90	2,725	21.4	5,110
10 × 8	4,400	188	40	2,725	20.0	5,425

For further details write for Bulletin No. 377-D.

"WK-32."

Comp. Size.	Weight, Pounds.	Displacement Cu. Ft.	Term. Press	*Motor H.P.	Price.
					Rs
7 × 6	*4,500	*93	100	15	6,050
8 × 8	5,125	121	100	20	7,380
9 × 8	6,060	152	100	25	7,995
10 × 10	10,490	213	100	40	10,660
11 × 10	10,645	258	100	40	11,070

*The motor H.P. is estimated only.

For further details write for Bulletin No. 377-D.

In addition to the previously mentioned types and sizes of Air Compressors the Sullivan Machinery Company are in a position to furnish:—

Steam driven Booster Air Compressors Type "WA-61" for pressures up to 500 pounds per sq. in.

Belt driven Booster Air Compressors Type "WG-61" for pressures up to 500 pounds per sq. in.

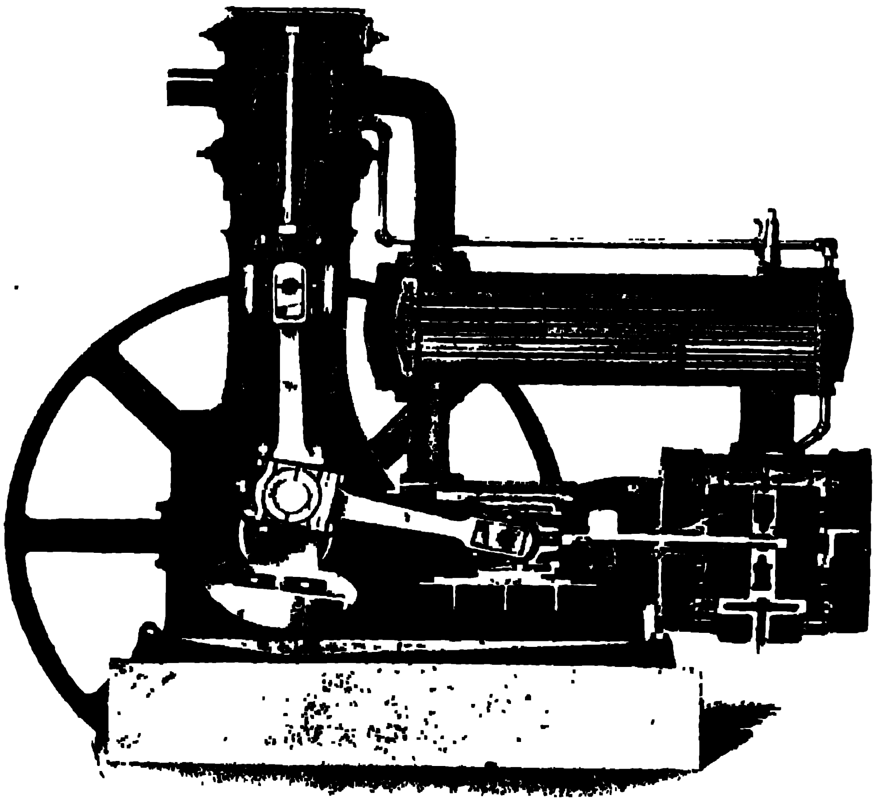
Duplex Two Stage Gas Compressors for Petrol extraction Type "WJ-61" for pressures up to 300 pounds per sq. in.

Details and prices of the above will be furnished on application.

Low Pressure Air Compressors Type "WI-3" will be taken up in detail with the "Sullivan Angle Compound Two Stage Air Compressors" (See following pages).

Sullivan Angle Compound Air Compressor.

Belt Driven Types—" W.J.-3 ", " W.I.-3 ", " W.J.-4 ", " W.I.-4 ".
Direct Connected Types—" W.N.-3 ", " W.M.-3 ", " W.N.-4 ", " W.M.-4
Steam Driven Types—" W.D.", " W.D.-4 ".



Angle Compound Sullivan Air Compressors have demonstrated since first introduced, some fifteen years ago, that they deliver more actual compressed air than any other type of power driven air compressor per unit of power, attention, supplies, maintenance, installation cost and floor space. **Angle Compound Compressors** are in use to-day in all parts of the world and under a multitude of conditions. In the **Angle Compound Compressors** both pistons are actuated by a single crank, and the driving pulley, or motive power, is mounted on one side, on an extension of the crankshaft. (For steam driven types see further description.)

Angle compound engines have been selected for many years to operate under conditions necessitating high speed, freedom from vibration and close economy. Some years ago special air compressors of very large capacity were built upon this principle. But it may be fairly claimed for the **Sullivan Angle Compound** that it is the only power driven air compressor now being built commercially in this design.

The following distinctive advantages are realized as compared with compressors whose cylinders are in the same plane, whether vertical or horizontal, as in the older duplex or cross compound types:—

1—Balancing of reciprocating forces.
2—Small floor space.
3—Low cost of installation.
4—Low power cost per unit of air compressed.
5—Low maintenance cost.
6—Flexibility of drive.
7—Reduction in care and attendance
8—Accessibility.

Sullivan Air Compressors.

"WJ-3" and "WJ-4" Two Stage Belt-Driven Angle Types.

(Single) and (Twin).

Air Cylinder			Displacement Cu. Ft. per Min	H.P. 100 lbs. Air Press.	Shipping Weight, Pounds	Price.
[illegible]	L. P.	Stroke.				
						Rs.
[illegible]	8¾	10	455—620	72—100	8,610	9,720
[illegible]	9¾	10	545—752	86—120	9,120	11,285
[illegible]	10½	12	705—941	113—153	12,500	12,950
[illegible]	11	14	869—1133	142—188	17,000	15,575
[illegible]	12	14	1011—1300	165—214	19,825	16,950
[illegible]	13	14	1224—1573	200—260	23,365	19,100
[illegible]	14½	16	1482—1852	243—307	29,260	29,850

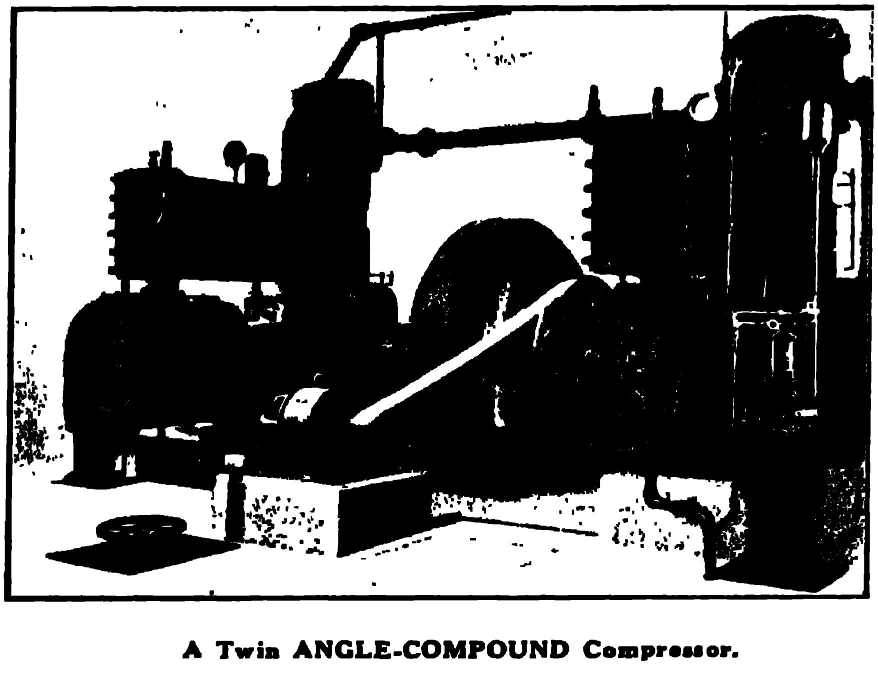
The above prices include unloaders, extra set of valves, foundation bolts
For further particulars write for Bulletin No 377-B.

"WJ-4."

The capacities and prices are approximately double those of the "WJ-3" as listed above. For further details write for Bulletin No. 377-B.

"WN-3" and "WN-4."

The capacities for these compressors are similar to corresponding sizes of the "WJ-3" and "WJ-4" types. The prices vary however according to the motive power used, and we will be glad to quote for particular installations on receipt of full details.



A Twin ANGLE-COMPOUND Compressor.

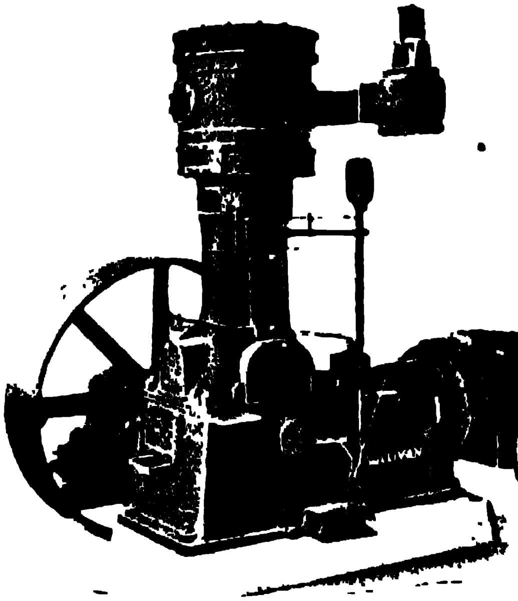
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan "WI-3" Single Stage Angle Compressors.

For Low Air Pressures.



The Sullivan low pressure Angle Compressor, for compressing air to not exceeding 40 pounds per square inch, in a single stage.

In this type the vertical and horizontal cylinders are of the same diameter. The intercooler is omitted, and air is compressed in both cylinders alike to the final pressure desired.

A common inlet conduit, with a single unloading valve, may be provided, or separate inlets, with separate unloaders for each cylinder, as desired.

"WI-3" compressors are available in single units to 2,750 cubic feet, and for pressures from 5 to 40 pounds.

Twin units of double the above capacities are also available, for direct motor connection Type "WM 4" or Belt drive Type "WI-4."

Air Cylinder.		Displacement Cu. Ft. per Min.	H.P Input lbs. Terminal Pressure.							*Price.
Dia.	Stroke.		10	15	20	25	30	35	40	Rs.
14	10	885	51	58	66	72	78	83	89	9,432
16	10	1158	66	76	86	94	101	..	.	11,140
17	12	1411	82	94	106	117	125	133	..	13,050
18	14	1842	108	123	139	153	164	174	184	15,320
20	14	2276	132	152	172	189	207	215	227	16,400
22	14	2754	160	184	207	229	..	..	..	22,550

* The above prices include two Inlet unloaders of standard size or one large size w the necessary piping, one extra set of valves and one set foundation bolts.

"WI-4" capacities and prices approximately double those of "WI-3" of corresp ding sizes

"WM-3" and "WM-4" are of the capacities of corresponding sizes of "WI-3" and "WI-4." respectively, and are constructed according to the same specifications. The prices vary however according to the motive power used. We shall be very glad to quote on particular installations on receipt of details.

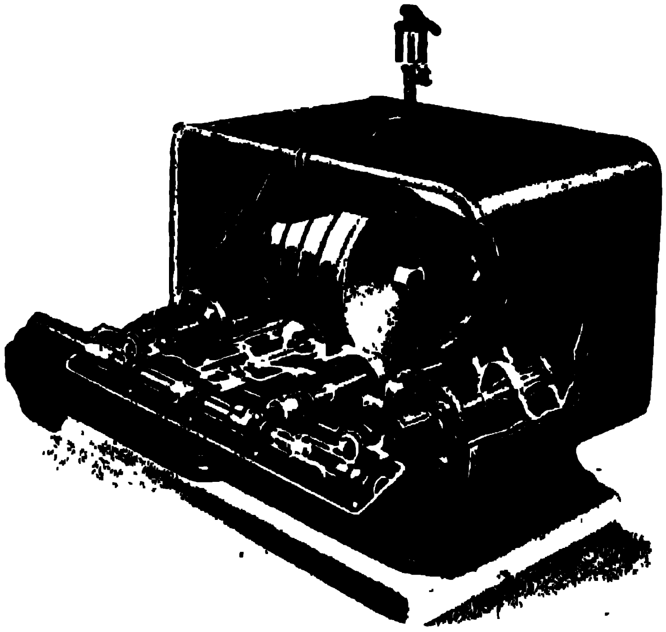
For further details write for Bulletin No. 377-B.

Sullivan Direct Flow Steam Driven Angle Compound Air Compressors.

Types "WD" and "WD-4" (Twin).

These air compressors are built on the same general specifications as the "WJ" and "WN" types with the addition of a steam cylinder attached to the outboard end of the low pressure air cylinder.

The steam valves are mechanically operated, the inlet being in the head and as far away as possible from the exhaust valves. The range of steam pressure which they will operate efficiently on is from 100 pounds to 200 and the speed from 70 to 225 R.P.M although when unloaded they will turn over as low as 5 R.P.M.



Cot away View of "WD" Steam Cylinder, showing Valve and Piston Action.

W. D. Cylinders. Steam	Air- L.P.	Air- H.P.	Stroke	Displacement Cu Ft Per Min.	I.H.P 100 lbs. Air Press.	Boiler-H.P. Con.	Boiler-H.P. Non	Price. Rs.
20	20	12	14	1138	190	100	133	34,225
24	24	14½	16	1730	285	135	181	46,250
"WD 4"								
20	20	12	14	2276	380	200	266	64,500
24	24	14½	16	3460	570	270	362	86,500

One set of foundation bolts and one extra set of valves included in the above prices.

For further details write for Bulletin No. 375-U.

Sullivan Duplex Vacuum Pumps, Type "WI-61".

These pumps are built on the same general specification as the "WI-3" air compressors with the modifications necessary to adapt them to this class of work. For petrol extraction, handling casing head gas, etc., where units of large capacities are needed they are unequalled in efficiency and economy.

Cyl. Diam	Stroke.	Displacement Cu Ft. per. Min	H.P. at Peak Intake Atmp Disc.	Price. Rs.
	12	2116	75	13,650
	12	3244	115	15,425

One set of foundation bolts are included in the above prices. These pumps will produce a vacuum on closed suction of 97 per cent. of the barometric reading.

Reheaters, After Coolers, Air Meters, Air Filters—Prices on application.

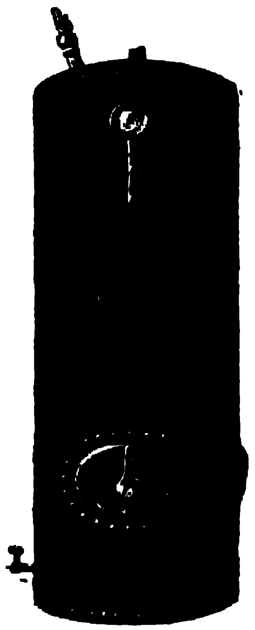
For suitable motors see Electrical Section.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

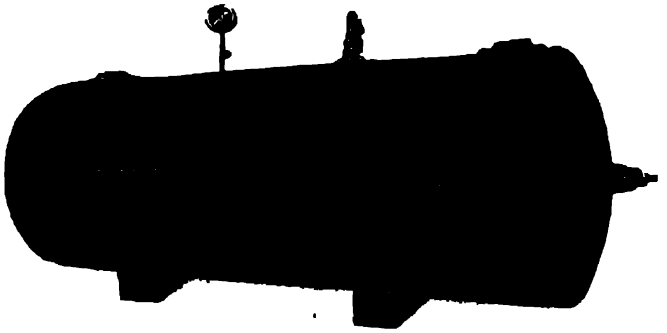
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Air Receivers.



Vertical Receiver.



Horizontal Receiver.

Sullivan Air Receivers are made of homogeneous steel plate, of 60,000 lbs. tensile strength, one sheet being used for the smaller and two or more for the larger sizes. Girth seams are single and side seams double riveted, and the receiver is tested under 150 lbs. cold water pressure for a working pressure of 100 pounds. Inlet and outlet openings are fitted with tapped flanges, into which the customer's pipe connections may be screwed. A manhole is provided with all receivers (except 16-inch, 22½-inch, 30-inch, 36-inch and 42-inch vertical receivers). A pressure gauge, blow off cock and safety valve are regularly supplied.

Diam inches	Length feet.	Capacity cu ft free air per min	Price,	
			Vertical.	Horizontal
			Rs	Rs.
16	5	0— 50	307	..
22½	5	50— 105	403	...
30	6	110— 248	479	479
36	6	250— 325	586	586
36	8	330 - 450	729	729
42	8	455— 680	852	852
42	10	685— 875	1,008	1,008
48	10	880—1100	1,305	1,305
48	12	1105 1425	1,435	1,435
54	12	1430—1900	1,770	1,770
54	16	1905—2600		2,177
60	14	2605 -3000	.	2,273
60	16	3005—3500		2,490

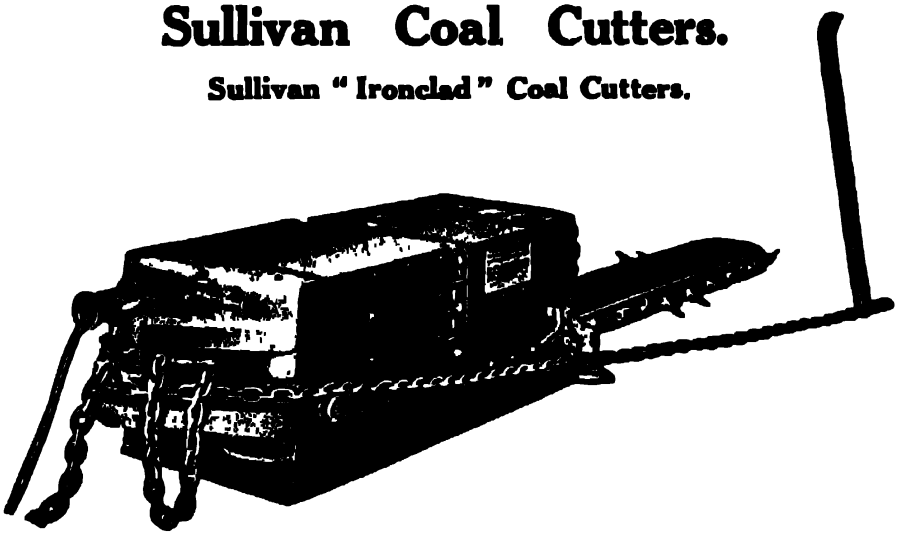
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

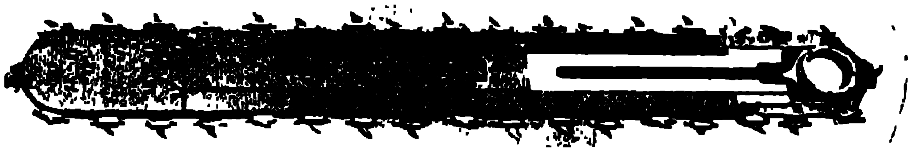
Sullivan Coal Cutters.

Sullivan "Ironclad" Coal Cutters.



There is no class of machinery that is called upon to stand such rough usage as the mechanical coal cutter of to-day. The nature of the work that it is expected to perform is such that unless the very best of materials are used and the most efficient design the weak spots are apt to develop in a very short time. This applies particularly to Indian conditions. The tendency of the Indian *mistri* to *chellau* as long as a wheel will turn, to take absolutely no care of any equipment, to take the oil home to burn rather than use it on the machine and the resigned "*tootgya sahib*" when the inevitable breakdown occurs are so well known that it is hardly necessary to mention them. The Sullivan "**Ironclads**" have stood the test and there are some working at present that have put in five hard years under these conditions.

They are virtually what their name implies, ironclad. The rigid cutter bar extending the entire length of the machine *cannot* be broken and with the exception of replacing liner strips as they wear will last for the life of the colliery.



Cutter Bar for Sullivan Ironclad Continuous Cutter.

The nine position "**Dreadnought**" cutter chains will cut through any coal and impurities found in India. The cuttings are much coarser than the average cuttings and there is not so much dust.

The haulage is a continuous chain haulage. The chain is threaded around sheaves at the rear of the machine which make it possible to move to right or left by merely reversing the feed. This is a great improvement over those machines which rely on a rope haulage of separate ropes wound on individual drums, as one rope must be released before the other can take up. If this is not done properly the machine is subjected to excessive strains. Nor is it necessary for the operator to use a hammer in tightening up the various clutches.

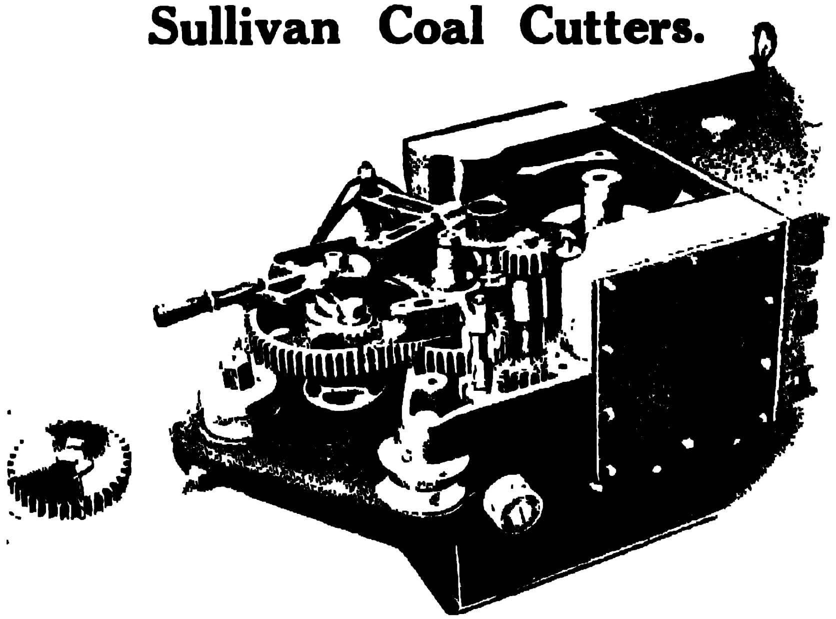
As a safeguard to the mechanism a friction clutch has been introduced into the haulage gear train which is adjusted so that while there will be ample power (6,000 to 7,000 pound pull) for the machine to operate successfully, should it become cramped it is impossible for an excessive strain to be thrown upon the machine itself. All the gears are of the spur type, with one exception, and are heat treated.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Coal Cutters.



Feed Gearing Section of Ironclad Coal Cutters.

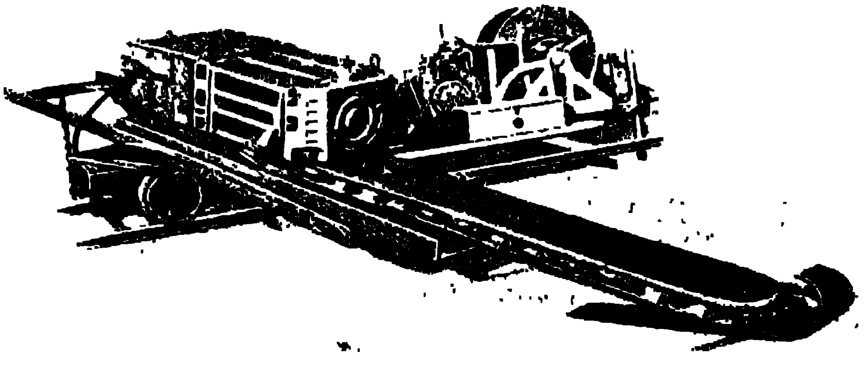
The motor is a totally enclosed, gas proof, A.C. of the squirrel cage type, and 30 H.P. This is ample in size as the hardest cutting encountered in India to date has only taken 23 H.P. (6-foot 6-inch cutter bar) on an average. This being the case why use a larger motor?

There is neither time nor space to go into all of the many advantages of the "Ironclad" machine. The most satisfactory way for the prospective buyer to assure himself that the SULLIVAN IRONCLAD machine is the best is to "ASK THE MAN WHO HAS ONE."

Also write for the following bulletins for further information:—

Sullivan Ironclads, for Room and Pillar Type "CE-7" ..	**Bulletin No. 379-D.**
„ „ Motors, Driving Gear, Cutters, Feed, etc.	**„ „ 379-F.**
„ for Strip Mines Type "CH-10"	**„ „ 379-A.**
for Room and Pillar Type "CE-9"	**„ „ 379-B.**
Tipturn Trucks for Ironclads	**„ „ 379-E.**
Sullivan Longwall Ironclads, Type "CH-8"	**„ „ 379-LA.**
„ „ „ Recent Improvements	**„ „ 379-L.**
„ „ „ Turbinair and Electric driven	**„ „ 379-H.**
Sullivan Ironclad, Overcutter Type "CE-11"	**„ „ 379-I.**

All of the above types are made electrically operated, A.C. or D.C any current characteristic, or with a Turbinair Motor for compressed air.



Sullivan Ironclad Coal Cutter Unloading from Tipturn, Truck, at an angle of 105 degrees.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

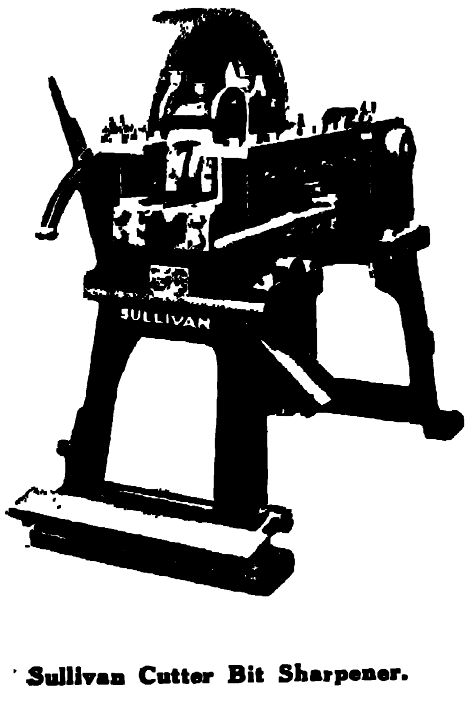
Sullivan Coal Cutters.

The machine which we have found most suitable for India and Indian conditions is the Sullivan Ironclad Type "C.E.-7" A.C. 550 volts 50 cycles with a 6-foot 6-inch cutter bar, nine position Dreadnought reversible cutter chain, 15-inch feed per minute across the face, and mounted on a Sullivan Tipturn Trolley.

Price, including 300 feet of four core flexible cab-type cable **Rs. 15,000.**

Prices on application for other types and combinations.

Sullivan Coal Cutter Bit Sharpener.



Sullivan Cutter Bit Sharpener.

Cutter bits, to give efficient service, must be of scientifically correct length, shape, and angle of cutting edge. They must be uniform in these characteristics. They must be of a good grade of steel, carefully hardened. They must be accurately set to gauge in the cutter chain and they must be renewed promptly when dull.

If intelligent attention and careful supervision are given this apparently small matter, a valuable factor of insurance against wear and breakage will be provided for the machines themselves. The power consumed by the machine in cutting a given tonnage will be materially reduced, more coal will be cut with each set of bits, and unproductive time and labour will be lessened.

The Sullivan Cutter Bit Maker and Sharpener has been placed on the market to assist Ironclad users in making proper bits for their machines and is securing excellent results for them. **Further particulars are given in Bulletin 372-L. .. Price, Rs. 4,750.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Rock and Hammer Drills.

The Sullivan Machinery Company have been manufacturers of rock drills of various types for the past seventy years and with this experience behind them are offering a range of drills that covers every contingency, from the " DB-131 " Hitch Cutter, weighing 14 pounds, to the "FP-33" "Hyspeed" reciprocating drill, of 740 pounds in non-rotating and self-rotating air, water or steam tube types, mounted and unmounted hammer drills and air, water or steam tube, mounted reciprocating drills. Capacities range from a ¾-inch hole 6-inches in depth to a 2-inch hole 40 feet in depth, and with various types and styles of mountings.

Sullivan "ROTATOR" Drills have been designed to deliver the greatest amount of work per cubic foot of air used. They are light, compact and have stood the test in India for the past five years. We have no hesitancy in offering them to our patrons and know that there is no other drill available that will approach them in performance.

Leading characteristics of Rotators may be summarized as follows:—

1. Automatic rotation of drill steel.
2. Air or steam operation (in separate types).
3. Drill steel retainer.
4. Automatic lubrication.
5. Automatic ejection of cuttings from drill hole.
6. Cushioned return stroke.
7. Adaptability to use on mountings.
8. Simplicity and convenience.
9. Drilling speed and power.
10. Strength, stability and low upkeep cost

For average conditions and where most of the holes to be bored are down we would recommend the Solid or Hollow Piston " DP-331 " types. The latter has more cleaning power and will drill holes readily up to eight or ten feet while six to eight feet is the normal capacity for the former. Where deep holes ten feet and over are to be drilled either the AIR TUBE or the WATER TUBE should be used. The latter where dust would prove objectionable or where the ground is too damp to allow the hole to be properly cleaned by the air jet.

SULLIVAN ROTATORS:—

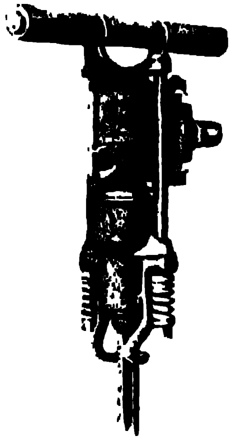
" DP-331 " " Rotator."
" DP-321 " Light " Rotator."
" DR-371 " Auger " Rotator."

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Rock and Hammer Drills.



Sullivan "Rotator" Drill.

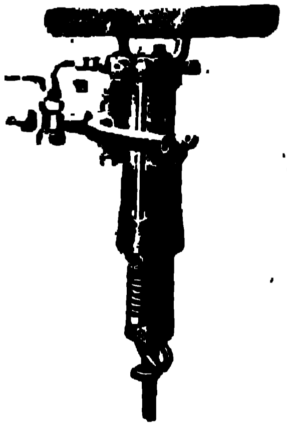
"DP-331" "Rotator" is made in five types:—

(1) Solid Piston—weight 38 pounds.
(2) Hollow Piston—weight 38 pounds.
(3) Steam Tube Piston—weight 38 pounds.
Price, Drill with equipment, **Rs. 575-0.**
(4) Air Tube—weight 38 pounds.
(5) Water Tube—weight 40 pounds.
Price, Drill with equipment, **Rs. 700-0.**

(For steel, hose and other equipment, see following pages.)

The Steam Tube "DP-331" has its limitations and is used mostly for surface work where the amount of drilling to be done is limited and compressed air is not available. The maximum depth hole is about six feet although ten-foot holes have been drilled under favourable conditions.

For further particulars write for Bulletin No. 381-B.

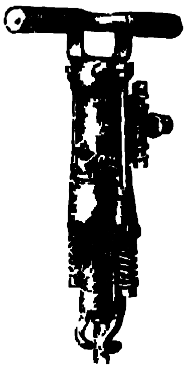


Sullivan Steam "Rotator."

Light "Rotator" "DP-321."

This drill has been developed to meet the demand for a light drill to be used where the majority of the holes drilled are in such a position that the drill has to be held up to its work, such as is usually experienced in collieries, quarries, etc. It weighs only 29 pounds and while it is not quite as powerful a machine as the heavier "Rotator" we have found, by repeated tests, that there is no drill of equal weight that can approach it for speed of penetration, ease of operation, or air economy. It is made in three types with Solid and Hollow Piston and Water Tube to suit various conditions.

A Sullivan "Ironclad" Coal Cutter, Sullivan Portable Air Compressor (WK-26) and a light "Rotator" make a trio for coal winning that are hard to beat.



Sullivan Light "Rotator."

For further particulars write for Bulletin No. 381-B.

"DP-321" Light "Rotator" is made in three types:—

(1) Solid Piston—weight 29 pounds.
(2) Hollow Piston—weight 29 pounds. } **Price,** drill with equipment, **Rs. 575-0.**
(3) Water Tube—weight 31 pounds. **Price,** drill with equipment, **Rs. 700-0.**

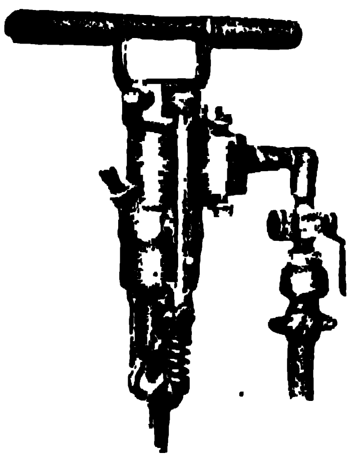
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON

Sullivan Rock and Hammer Drills.

Auger "Rotator" "DR-371."



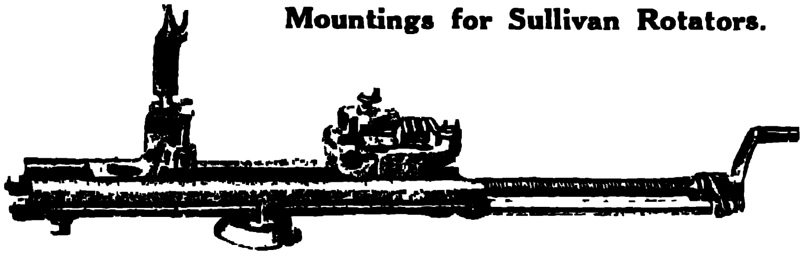
Sullivan Auger "Rotator."

This drill has been designed for use in soft and broken ground where the blow of the "DP-331" is too heavy and tends to bury the bit in the material and clog the drill. It differs from the former inasmuch as the weight of the blow has been lightened and the rotation made more positive. In the "DP-331" Rotator the steel is rotated during the upward stroke of the piston, this action is reversed in the Auger "Rotator" taking place on the downward stroke. Four pawls are used in the ratchet and the rotation is a great deal stronger. We recommend this drill where soft or broken ground is to be penetrated. It is made in three types: Solid and Hollow Piston and Water Tube. The first is used commonly with twisted auger steel and fish-tail bit, the other two when deeper holes are required and other conditions require them.

"DR-371" Auger "Rotator" is made in three types:—

(1) Solid Piston, weight 35½ pounds.
(2) Hollow Piston, weight 35½ pounds.
Price, drill with equipment, **Rs. 575-0.**
(3) Water Tube, weight 37½ pounds.
Price, drill with equipment, **Rs. 700-0**

Mountings for Sullivan Rotators.

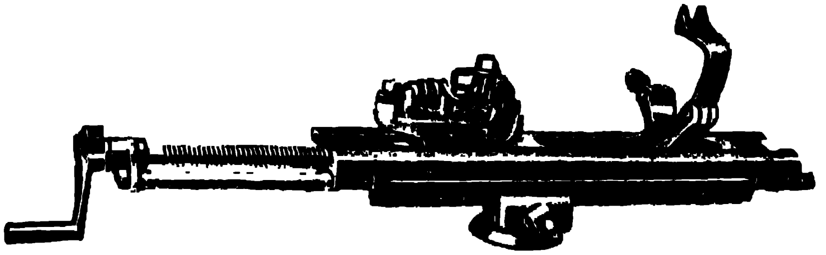


"D-721" Cradle and Shell Mounting for Rotators.

The low weight of the Sullivan Rotator permits it to be used for drilling side or horizontal holes, or those directed upward, without excessive labour. For steady work of this sort, for deeper holes and hard rock, and for light drifting or stoping, the use of a mounting is recommended. Several types of mountings are available. Those described are in successful use, and aid in rendering the drilling field of the Sullivan "Rotator" well-nigh universal.

The Water Tube Rotator is recommended for use with mountings, as it is most effective for drifting work.

Two types of "cradle" mountings are shown on this page. They consist of a light shell and feed-screw, similar to those employed with Sullivan Mounted Hammer Drills, but equipped with a cradle to receive the drill, and two hinged clamps.

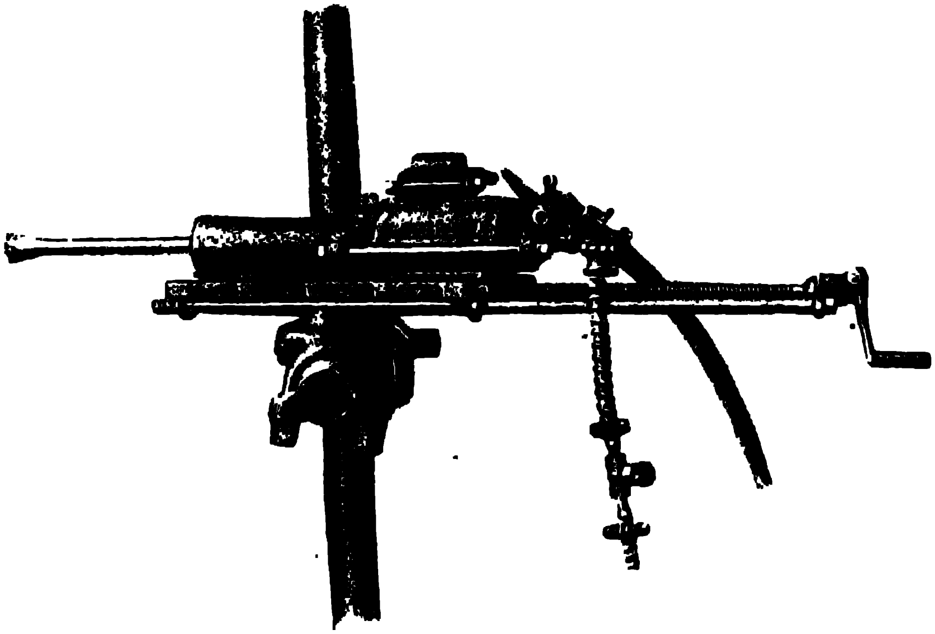


"D-731" Cradle Mounting, with ways and loose trunnion.

Prices, Mounting, "D.-721," **Rs. 405-0.** Mounting, "D.-731," **Rs. 450-0.**
For further particulars write for Bulletin No. 381-B.

Sullivan Water Hammer Drill.

"DW-64" (weight 131 pounds.)



Sullivan "DW-64" Water-Jet Drifting Hammer Drill.

This drill is intended for drifting, tunneling and all the heavier kinds of rock drilling work for which a mounted drill is desirable. It may be mounted on a bar, tripod, quarry bar, etc., as wished. High drilling speed, adaptability to hard and solid or soft and broken ground or to high and low air pressure, air economy, light weight and convenience for the runner, simplicity and ruggedness, resulting in low repair cost and ability to stay on the job, are all incorporated in this one drill •

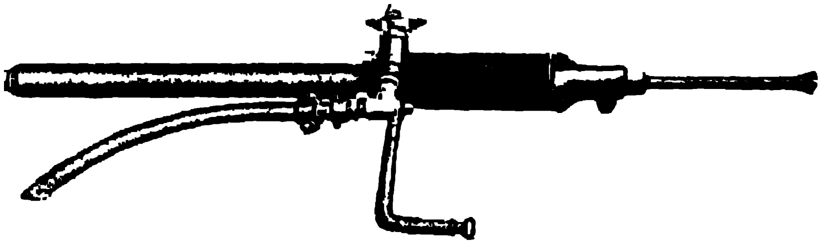
The designers have reached the limits of endurance of the steel available for drills. In other words, until the quality of the steel is improved it is useless to increase the power of the drill as it will only result in broken steels. Repeated tests have shown the " DW-64 " to be the most economical, and fastest drilling machine available at any price and we cannot recommend this machine too highly to those of our clients who are anticipating heavy rock work. It has drilled holes repeatedly to a depth of twenty-five feet in all kinds of ground and is remarkable for its balance, smoothness of operation and light weight.

For a full description of this record breaker write for Bulletin No. 381-C.

Price, drill and equipment	**Rs. 1,520-0**
" " " " fitted with handle and without feed screw shell, to be used as a sinking drill	**" 1,280-0**

For steel, hose, mountings and accessories see subsequent pages.

Sullivan Valveless Stoping Drills.



Class "DT-44" Hand Rotation Valveless Stoper.

This class includes types:—
Light Weight Stoper wet or dry "DT-44", weight 72 pounds.
Automatic Rotating Stoper wet or dry "DT-421", weight 95 pounds.

Prices:

"DT-44"—Dry, **Rs. 820-0;** Wet, **Rs. 920-0.** "DT-421"—Dry, **Rs. 1,100-0;** Wet, **Rs. 1,200-0.**

For further details write for Bulletin No. 370-Y.

Sullivan Non-Rotators.

These include the DB-13, DB-132, DB-131 (Hitch cutters), DB-221 (Concrete breaker), DC-19 (Sinker), DE-36 (Pick hammer), DE-361 (Spader), DF-31 (Block holer), and DH-3 (Plug drill) DB-13, and DB-131, DB-132 Hitch cutters:—

These little drills (14 pounds) have been designed to meet the demand for a light but sturdy machine to use in places not easily accessible, such as cutting water rings in shafts, hitches for cross members, shaping up rough masonry, etc. They consist of a cylinder with a "U" handle mounted on the rear end and a steel retainer on the front. A push throttle is used on the DB-13 and 132 and a thumb throttle on the DB-131. The DB-132 has no steel retainer. **Price,** drill and equipment, **Rs. 308-0.**

Sullivan Concrete Breaker "DB-221."

The great increase in the use of concrete in construction has given rise to a growing demand for some mechanical method by which hand tools could be replaced in the removal or breaking of openings in walls or pavements. The **Sullivan Concrete Breaker** (65 pounds) is a substantially built and powerful machine designed for this purpose. One machine has dug out twenty cubic feet of heavy retaining wall per day, and in another instance three machines removed from 2,400 to 2,700 square feet of pavement eight to twelve inches thick per day. They have proved themselves invaluable in removing asphalt pavement, a special chisel having been designed for this purpose, and can be used to advantage as hammers in driving light sheet piling to moderate depths.

For further particulars write for Bulletin No. 381-D

Price, drill and equipment, Rs. 700-0.

For hose, steel, etc., see page 412.

Sullivan "DB-221" Concrete Breaker.

Sullivan Heavy Sinker.

Sullivan Heavy Sinker "DB-21" (62 pounds).

We would recommend the use of this drill where block holing is to be done and the matter of rotation is not so important. It is not as efficient as the "Rotators" but will give good results up to six feet. **Price,** drill and equipment, **Rs. 440.**

For hose, steel, etc., see page 412.

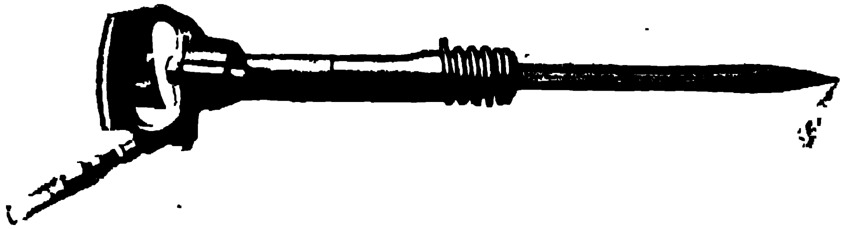
Sullivan Sinker "DC-19" (weight 44 pounds.)

This drill is very similar to the "DB-21" Heavy Sinker but lighter in weight and without quite the penetration of the heavier drill. Where the limits of drilling are between two and four feet this will be found to be a most economical and rapid driller.

Price, Drill .. .. **Rs. 372-0**

For steel, hose, etc , see page 412.

Sullivan Pick Hammer "DE-36" (weight 16 pounds).



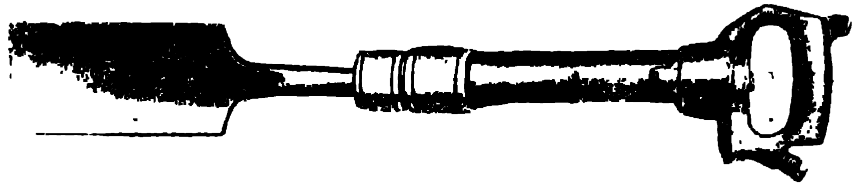
Sullivan "DE-36" Pick Hammer.

Ever since the introduction of mechanical coal cutters the need has been felt for something to replace the hand pick. The Sullivan Pick Hammer was introduced into the United Kingdom and on the Continent in 1920 and met with instant success. Designed primarily for dressing ribs and winning coal at the face, they have been found indispensable for dressing pits, cutting away old masonry and concrete, digging drainage ditches, driving dog spikes and when not in use in the pit as chipping and caulking hammers, and as rivetters in the shops and around the surface.

Price, Tool with equipment .. .. **Rs. 328-0**

For further details write for Bulletin No. 373-X.

Sullivan Spader "DE-361."



Sullivan "DE-361" Spader.

This tool is with the exception of the thumb throttle and retainer the same as the Sullivan Pick. It has been used with a great deal of success in the construction of the recent subway extension in London and other excavating work where hard digging was encountered. Two sizes of spades are available, 19 or 29 inches in length and five inches wide, any size can be made up however at very little additional cost.

For further details write for Bulletin No. 370-X.

Price, Spader with equipment and 19 ins. spade, **Rs. 380-0.** Do. 29 ins. spade, **Rs. 390-0.**

Sullivan Block Holer "DF-31" (weight 25 pounds).

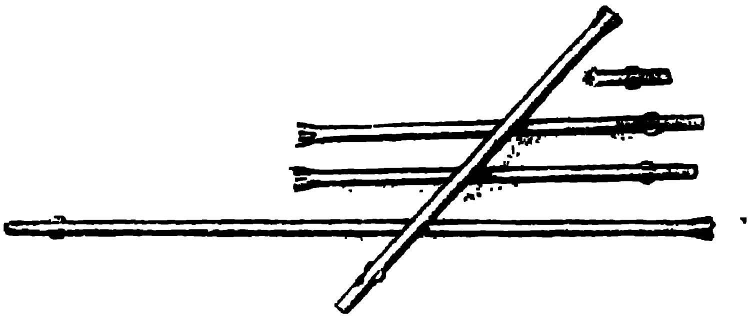
This drill is of the same design as the Sullivan Sinker "DC-19" but much lighter in weight and is adapted for work up to four feet. The rotation is effected by the operator turning the drill while in operation, and as in the case of the former all of the exhaust air may be turned into the steel to clean the hole.

Price, Drill and equipment .. .. **Rs. 268-0**

For hose, steel, etc., see page 412.

Drill Steel for Sullivan Hammer Drills.

All steel quoted below is sharpened and shanked but **NOT** tempered.



Hollow, round steel with 4-point bits and lugged shanks, for "DW-64" Drills.

Drill Steel used with Sullivan Rotators.

(1)—Hexagonal Hollow Steel with Rose Bit

(2)—Hexagonal Hollow Steel, Cross Bit

(3)—Solid Twisted Steel with "Fish-tail" Bit (for the Auger Drill).

"Bull" or Pick Point, and Chisel Edge Tools for concrete and asphalt cutting.

Drill Steel.

Type Drill.	Cross Section Steel.	Length, feet.	Price. Rs.	A.
DP—331, 321	⅞"	2	12	8
DR—371	Hollow	4	17	0
DF—31	Hexagonal	6	21	0
		8	24	8
DR—371	1⅛" solid	3	27	0
	twisted	6	44	4
	Section VII	9	55	12
DE—36	1" Hexagonal	15 inch	11	12
	Solid	18 ,,	12	8
		24 ,,	13	4
DW—64	1¼"	2 feet	21	8
	Round	4 ,,	28	0
	Hollow	6 ,,	35	12
		8 ,,	43	4
		10 ,,	51	0
		12 ,,	58	8

Air and Steam Hose with connections.

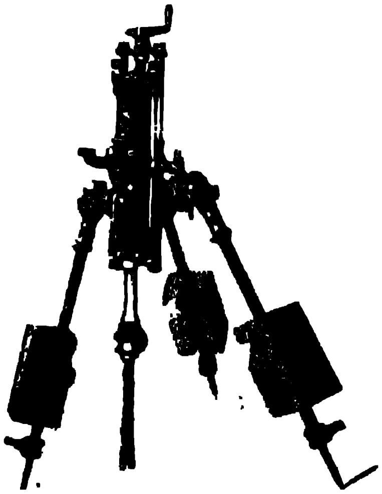
Type Drill.	Size.	Length.	Pric Plain Rs.	A.	Wire Wound. Rs	A
DP—331 & 2						
DR—371		25 feet	52	8	65	0
DT—44, 421		50 ,,	90	0	115	0
DP—331		25	75	0		
Steam	¾"	50	135	0		
DW—64		25			88	8
		50			153	8
DB—221		25	69	4	82	12
		50	106	12	131	12
DB—131 & 2						
DP—13	½"	25	43	4	49	8
DC—19		50	62	0	74	8
DE—36, 861						
DF—31		25	40	0	45	0
DH—3		50	57	8	67	8

Sullivan Rock Drills.

(Reciprocating.)

"Hyspeed" and "Liteweight" Types.

While it is true that the development of hammer drills during the past few years has caused the substitution of this part of tool for the older reciprocating piston machine in work of many kinds, it is also true that there is and always will be a variety of drilling work, in which the earlier drills form the most effective means for boring blast holes in rock. In open cut contract work and in quarrying the piston drill is particularly valuable.



Sullivan Tripod Drill.

It differs from the hammer drill inasmuch as instead of having a piston delivering a blow on the end of a stationary drill steel, the steel moves with and is an integral part of the piston. The blows are much slower but the moving parts much heavier. This construction necessitates much more metal with the result that the entire machine is much more cumbersome than the hammer drill They are particularly adaptable for holes of large diameter and where steam is used as the motive power. We would recommend them for quarries where dimension work is not demanded and where the holes are deep, or the smaller sizes for railroad or highway construction where compressed air is not available and the holes are beyond the capacity of the Steam "Rotator."

They are built in the following sizes, for steam, compressed air, solid, hollow piston or with water jet. For mountings see page 414.

For further particulars write for Bulletin No. 370-Q.

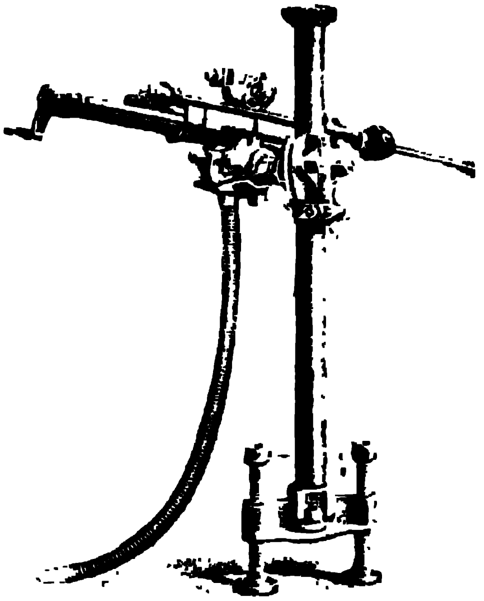
Type.	Class.	Weight.	Diam. Hole Inches.	Depth. Feet.	Price.
					Rs.
'HYSPEED'	FG—3	255	1½	14	1,710
	FG—3	280	1⅝	17	1,872
	FL—3	335	1⅞	19	1,998
	FP—3	385	2⅛	20	2,147
	FP—33	740	2⅛	20	3,704
	FS—3	650	2⅝	27	4,390
'LITE-WEIGHT'	FF—12	167	1⅜	11	1,566
	FL—12	300	1¾	18	1,998
	FP—12	330	1⅞	20	2,147

Prices for hose, steel, mountings, see page 414.

Mountings for Sullivan Drills.

Bars, tripods, quarry bars and gadoers are available for the above drills and prices will be furnished on application. For estimating purposes add 33% for tripods, and 25% for columns, to the price of the drill.

For further details write for Bulletin No. 370-U.



Sullivan Drill on double-screw column.

Hose and Connections for "Hyspeed" and "Liteweight" Drills.

Type.	Diameter, inches.	Length, feet.	Price			
			Air (wire wound).		Steam (marline wound)	
			Rs	**A.**	**Rs.**	**A.**
FF—12	¾	25	**65**	**0**	. . .	
		50	**115**	**0**	. . .	
FL—3 & 12	....	25	**84**	**4**	**109**	**4**
FG—3, FJ—3	1	50	**149**	**4**	**198**	**4**
FP—3, 12	....	25	**96**	**0**	**97**	**12**
FP—33	1¼	50	**169**	**12**	**272**	**4**
FS—3						

Steel for "Hyspeed" and "Liteweight" Drills.

Owing to the variations in conditions it is impossible to give prices to suit all requirements. For estimating purposes the following figures may be used.

Price per foot:—

Solid steel—1⅝ ins. **Rs. 13-4;** 1⅜ ins. **Rs. 7-8;** 1¼ ins. **Rs. 6-8;** 1⅛ ins. **Rs. 6-0;** 1 in. **Rs 4-8.**

Hollow steel—1⅝ ins. **Rs. 8-8;** 1½ ins. **Rs. 7-8;** 1⅜ ins. **Rs. 6-8;** 1¼ ins. **Rs. 5-12;** 1⅛ ins. **Rs. 5-0.**

Blacksmith Tools for Hand Sharpening and Shanking.

Prices for these will be quoted on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

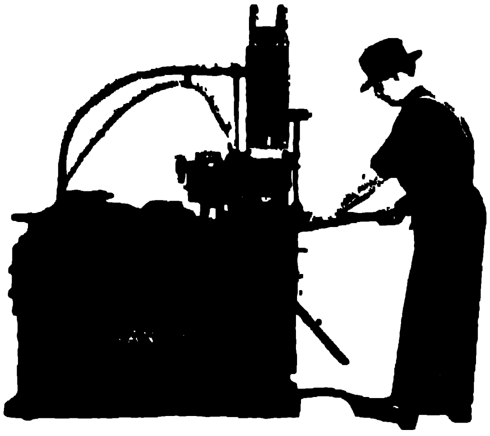
JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Drill Steel Sharpeners.

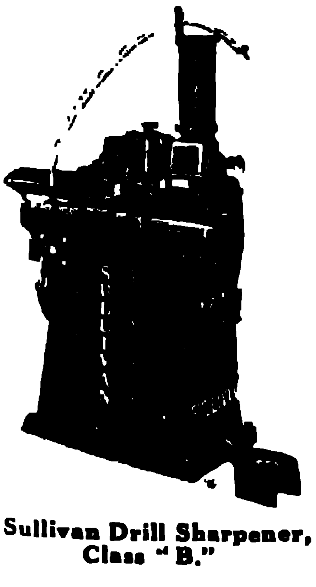
For Hammer Forging Drill Bits and Shanks.

The Sullivan Drill Sharpeners are compressed air machines for making and resharpening rock drill and hammer drill bits by **Hammering** (not squeezing), and are built in two sizes. They consist essentially of a clamp or vice, an upsetting hammer and a swaging hammer, mounted on one compact frame, as shown in the illustrations.



Sullivan Drill Sharpener, Class "A."

Much deserved emphasis has been laid, in the past years, on the importance of proper drill bits. This cannot be too strongly urged. No matter how carefully the drills have been selected for the work to be done, or how efficient they may be, poor drill steel, steel improperly forged or tempered, or bits of unsuitable shape or not uniform in gauge, will nullify the excellence of the drilling machines. Poor bits mean lost holes, undue drill wear and breakage, delay in repairing them, loss of time and curtailment of output. There is no better insurance for satisfactory progress for the mine, quarry or contract than an adequate supply of good drill steel, properly sharpened, shanked and tempered.



Sullivan Drill Sharpener, Class "B."

The class of work which may be done on these machines is not limited alone to drill steel but they are useful in sharpening hand jumpers, hand picks, the making of dog-spikes out of scrap, bolts, rivets, etc.

For all round general work and Indian conditions we would recommend the class "A" Sharpener. It is heavier and can be used for a much wider range of work. Where there are a great many hammer drill bits to be dressed and made and for contractors the class "B" is more suitable because of its lightness.

Price:

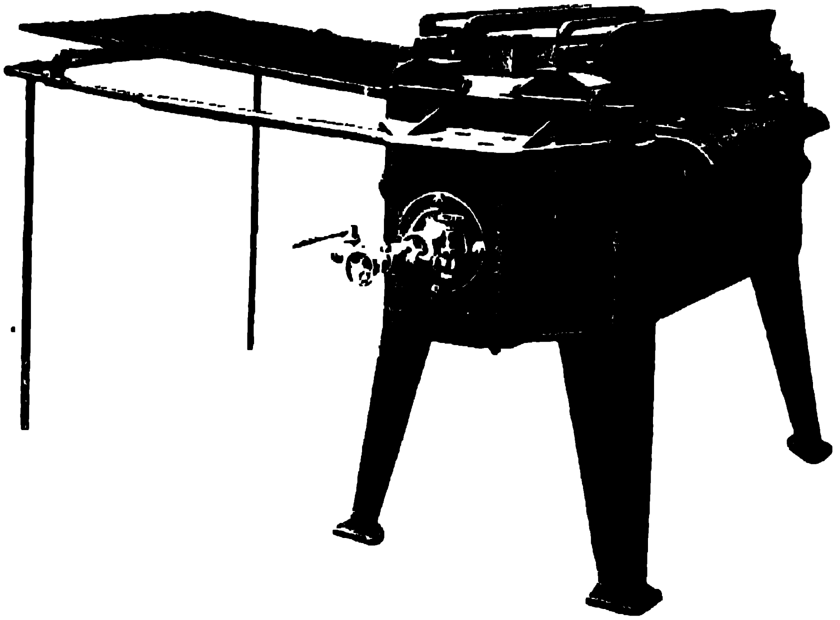
Class "A" Sharpener and equipment but with no dies or dollies (weight 4,000 pounds) ..	.. **Rs. 5,740-0**
Class "B" Sharpener and equipment but without die or dollies (weight 1,500 pounds) ..	.. **Rs. 5,125-0**

Dies and Dollies.

Prices will be given for dies and dollies on application. Full details should be given as to the nature of the work to be performed and sketches sent when possible.

For further details write for Bulletin No. 372-H.

Sullivan Drill Steel Furnace.



The Sullivan Drill Steel Furnace, shown in the above illustration, has been especially designed for the purpose of heating drill steel bits and shanks for rock and hammer drills. It employs oil or gas as fuel in combination with a compressed air blast, at from one to five pounds' pressure

The Sullivan Heating Furnace consists of a rectangular cast-iron box, 4½×2½ feet in area and 2 feet deep, supported on four legs. The heating opening or hearth is 34 inches long, 4 inches high, and 3¾ inches wide, surrounded by standard fire brick. An atomizer for burning oil in combination with low pressure air, or a carburettor for burning gas is attached at one end of the hearth. The length of the pieces to be heated is governed by an adjustable stop, and the hearth brick are contained in a movable holder or steel clamp which can be adjusted as to position to govern the work to be done, so that the operator may heat only the points of the bits for tempering, or a longer section for upsetting, as in making shank lugs.

By means of a suitable pyrometer, the purchase of which is always recommended as a part of the furnace equipment, the operator can maintain the temperature in the furnace at the proper maximum at all times, avoiding any danger of overheating the steel and thus burning and destroying the cutting and wear-resistant qualities of the bits. The importance of this feature cannot be emphasized too greatly. **BULLETIN 374-A.**

Price, Sullivan Drill Steel Furnace and Equipment **Rs. 1,575-0**

Sullivan Hoists.

No. 47.

Single Drum "Turbinair' Hoist.

Sullivan Hoists are made in the following types:—

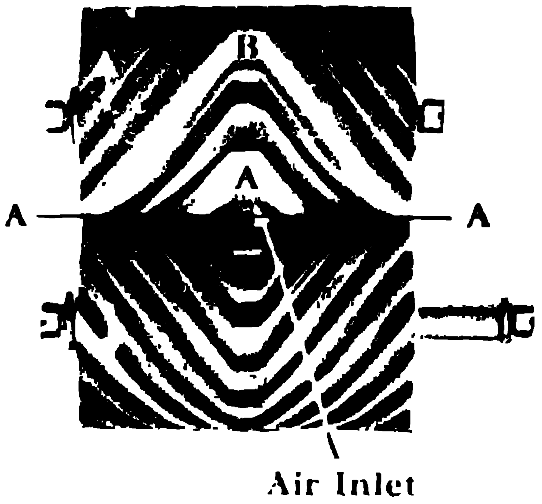
Single	Drum	"Turbinair"	Hoist	Type	"HA"
Double	,,	,,	,,	,,	"HDA-2"
Single	,,	Steam	,,	,,	"HS"
Double	,,	,,	,,	,,	"HDS"
Single	,,	Electric	,,	,,	"HE"
Double	,,	,,	,,	,,	"HDE"

These Hoists have a lifting capacity of 2,000 pounds at 110 feet per minute on 75 pounds air pressure. The Single Drum types have a drum capacity of 500 feet of 15|16 ins. wire rope and the double drum 250 feet on each drum.

The Sullivan Hoist is novel in design but exceedingly simple in construction. It consists of a cylindrical drum mounted on a steel frame and completely enclosing the operating mechanism.

This comprises a **Sullivan "Turbinair"** Motor and reduction gearing which drives the drum shell. The hoist is provided with friction clutch and brake. When both of these are released the rope may be pulled freely from the drum. The friction clutch may be locked in position and the load raised or lowered, controlled entirely by the throttle valve. The brake is of the band type and is of sufficient strength to hold any load within the capacity of the hoist. It works smoothly, thus putting no unnecessary stress on mechanism or rope.

The air is admitted at the axis of the drum through a hollow shaft, and the motor revolves with the drum. Ball bearings are employed and all mechanism is totally enclosed and well lubricated. The rotors are lubricated by an automatic oiler.



Cross-section through Sullivan "Turbinair" Motor.

This construction allows the use of the air expansively to a greater extent than the reciprocating type. (See illustration. A is air at intake pressure and corresponds to the position of cut off in a reciprocating engine. B shows the position at discharge. The difference between the areas is the amount of expansion utilised). This results in a higher efficiency, a higher gear ratio hence greater power, simplicity of design resulting in fewer

Sullivan Hoists—(*Concld.*)

wearing parts and lower maintenance cost. There is not a portable pneumatic hoist on the market which will deliver as much work per pound (1 H.P. per 44 pounds) as the **Sullivan Single Drum "Turbinair" Hoist.** Overall dimensions are length 22 inches, width 13½, height 15¾, and weight exclusive of rope 285 pounds.

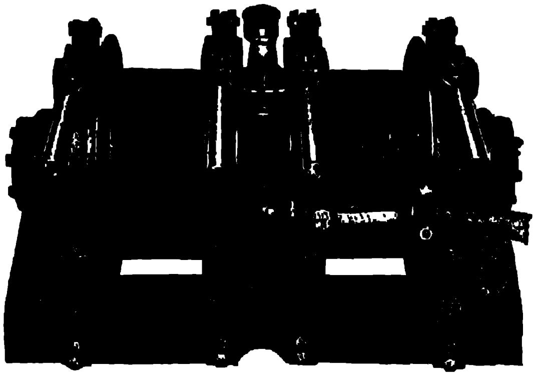
Other advantages that the "Turbinair" has over similar machines of other makes are quietness of operation and lack of vibration.

They lend themselves particularly to pit sinking, construction jobs, auxiliary winding on underground inclines spotting wagons at tipples, and various other jobs too numerous to mention.

For further particulars write for—

Bulletin No. 376-C (single drum) and Bulletin No. 376-D (double drum).

Type.	Reference.	Weight pounds without rope.	Price, without rope.
"TURBINAIR"			Rs.
Single Drum	HA	285	1,825
Double „	HDA-2	680	2,875
STEAM.			
Single Drum	HS	424	2,415
Double „	HDS	575	3,220
ELECTRIC.			
Single Drum	HE	450	2,400
Double „	HDE	750	3,450



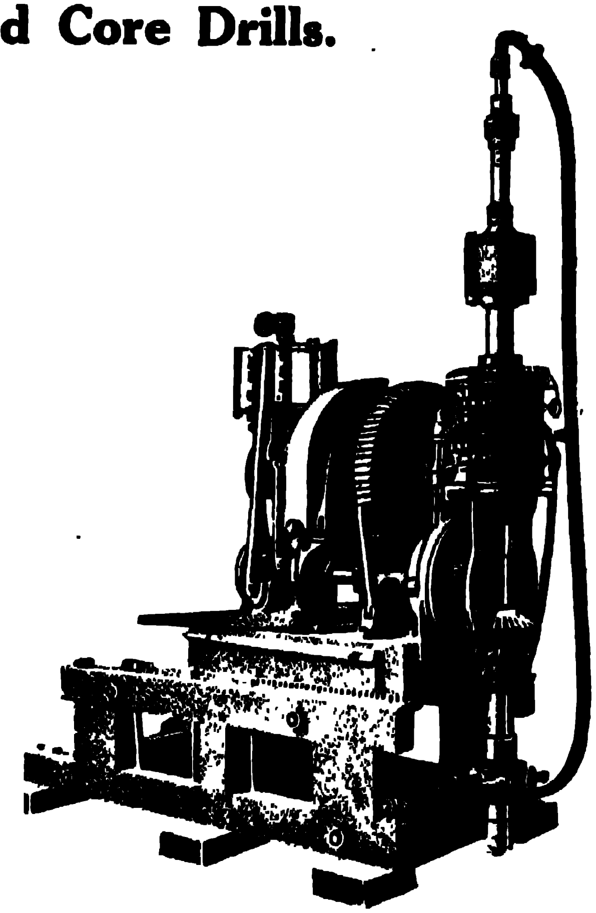
Sullivan Double Drum "Turbinair" Hoist.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Diamond Core Drills.



For Mineral Prospecting,
Coal Prospecting,
Dam Site Testing,
Tube Wells for Water,
and for all work where an accurate record is wanted of the material penetrated.

The equipment consists of:—

(a) Drill
- Engine or motive power
- Hoisting Drum
- Banjo and clutch for turning the rods.

(b) Rods,
(c) Core barrel,
(d) Bit,
(e) and fittings.

They are built in the following sizes:—

Type.	Size Core Inches.	Depth Hole Feet.	Weight Pounds Std. Equ.	*Price, Rs.
Bravo Hand Power	13/16	500	1085	4,374
" Belt Driven	13/16	500	1485	5,574
"F" Steam or Air (underground) ..	13/16	500	1408	9,492
Beauty Steam	13/16	800	1715	12,792
"C" "	1⅛	2200	3947	19,038
"B" "	1⅜	3200	5538	27,258
"CN" "	2	1200	4329	20,988
"N" "	2	2500	5730	29,256
"P" "	2	5500	10924	51,936
"P-2" "	2¾	3000	11500	1,20,000
"FK" " .. .	2¼	5000	20000	1,98,000

*Prices are approximate only inasmuch as the equipment varies with the work to be undertaken. On receipt of full particulars we will be glad to submit estimates suitable for the work contemplated.

Where a larger core is required than given the depth is materially lessened, *e.g.*, the "N" drill is rated to take a 2-in core or 2 13|16-in. hole to 2,500 feet, should a 6-in. core or a 6½-in. hole be required the depth would be reduced to 700 feet.

The single hydraulic and double tube core barrel are refinements that are confined to Sullivan Drills.

A great many of these drills are in use in India, the patriarch of them all is now nearly 25 years old and is still going strong.

For further details write for Bulletin No. 369-R.

Diamond Drilling for Oil **Bulletin No. 380-0** and **Booklet No. 3124.**

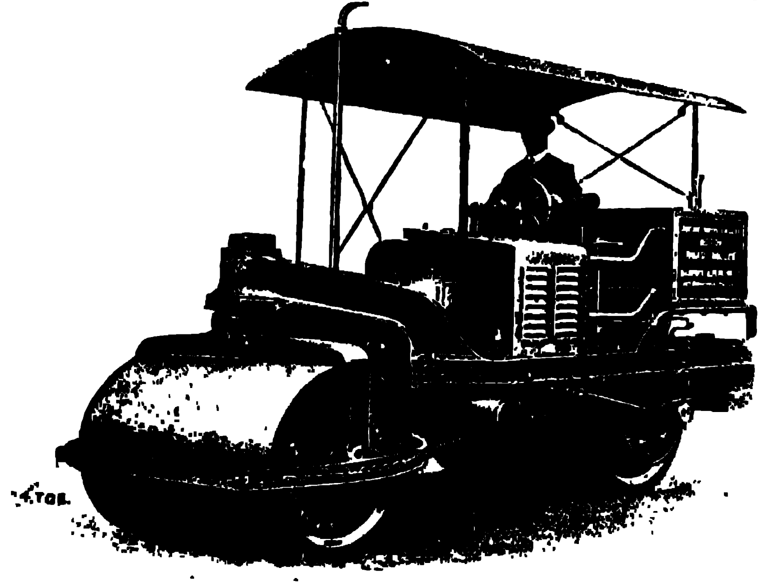
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Pioneer" Water Ballast Motor Road Rollers.

Barford & Perkins' Patents.



As Sole Agents in India and Burma for the Motor Rollers made by Messrs. Barford and Perkins, Ltd., of Peterborough, we carry stocks of all sizes in general demand and can give deliveries on rails at Calcutta, Madras, Bombay, Karachi, Delhi and Rangoon. We also maintain a spare part service for the benefit of our buyers.

The advantages of the Motor Type Road Roller as compared with the Steam Road Roller are dealt with fully in our special Bulletin which will be sent to all interested in road construction and maintenance. It is only necessary to refer here briefly to the claims which we make in favour of the Motor Type Roller which we offer.

Advantages.

First Cost.—The first cost is considerably less than that of steam rollers of equivalent weight.

Fuel Cost.—" Pioneer " Rollers operate on Kerosene—a small amount of Petrol being required for starting up—and the fuel cost is almost invariably less than that for a steam roller burning coal.

Saving in Labour.—The greatest economy in labour charges is possible with the " Pioneer " Roller which requires only one attendant.

Saving in Time.—The Roller can be started at any time and proceed at once to its work. There are no stand-by losses, no time required for raising steam or drawing fires, and no boiler cleaning or boiler inspections.

Skill Required for Driving. Experience shows that any mechanic can learn to drive a " Pioneer " Motor Roller in a few hours. The qualifications which should be possessed by the driver of a steam roller are not essential. We undertake to instruct buyers' drivers in the management of our rollers.

Water Ballast.—The addition of Water Ballast enables considerable variations in the total weight and its distribution to be made. The advantages of this will be obvious to all road engineers.

Tandem Arrangement of Rollers.—The tandem arrangement gives a much more even rolling effect and avoids the undesirable concentration of weight on narrow rear rollers. When working on narrow District Roads the reduced overall width of a tandem roller is sometimes an additional advantage.

Spare Part Service.—We carry ample stocks of Spare Parts and in this respect we can give a more efficient service to road roller buyers than any other firm in India.

Special Advantages for District Work.—When rollers are working at a distance from Head-quarters the supply of water and fuel is often a difficult matter to arrange. The Motor Road Roller requires only a small quantity of make-up water and one-eighth of the weight of fuel that a steam roller needs. We can supply the rollers fitted with fuel tanks to carry sufficient oil for a week's work.

Motor Roller Tests.—In 1921 a week's test was made of a 9-ton Motor Roller under the observation of the Calcutta P. W. D. and 26 gallons of kerosene were consumed in 53 hours working. The roller is mainly used for consolidating tarmac roads and is found to be more suitable for this than the three-wheeled type of roller.

Full particulars of the test will be sent on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Pioneer" Road Rollers in India.

"Pioneer" Motor Rollers have been used in India since about 1908. In recent years—due in a large measure to the reduction in cost of manufacture compared with other types and a general appreciation of the utility of the Motor Roller for work in India—large numbers have been ordered.

At the present time (1923) "Pioneer" Motor Rollers are being used by about 80 Public Bodies in India, while in 1919 one Province alone ordered 31 "Pioneer" Rollers. The number of repeat orders which we receive are the best possible testimony to the popularity of the Rollers with those who have had experience with them.

We give below a list of the principal users in India.

Superintending Engineer—Chindwin Circle.
Do —Sirhind Canal
Executive Engineer —Amritsar Canals
Do. —Lucknow (three Rollers, repeat orders)
Do. —Mandalay.
Do. —Sheikpura Division, U C. Canal, Punjab (two Rollers)
Do —Taungyi Division, Burma.
Do —Port Blair.
District Engineer —Anantapur
Do. —Chatrapur (Ganjam District).
Do —Chingleput (Madras).
Do —Durbhanga.
Do —Kistna (two Rollers).
Do —Kurnool.
Do. -- Do. (Repeat order).
Do —Lucknow.
Do. —Madura.
Do —Monghyr.
Do. —Patna.
Do. —Purulia (Manbhum).
Do. —Tinnevelly.
District Board Engineer—Coimbatore.
Do. —Guntur.
Do. —Nellore.
Do. —North Arcot.

District Board Engineer—Ramnad.
Municipal Engineer —Bangalore.
Do. —(C. & M. Station)—(Repeat order).
Do —Daltongunge.
Do —Hyderabad (Sind).
Do —Mussoorie.
Do —Simla.
Chief Engineer —O. and R Railway, Lucknow.
Do. -- Do (Repeat order for Moradabad).
Do —East Indian Railway.
Do —Rampur State
Do --Kotah State.
Public Works Department—Assam.
Do —Burma (31 Rollers).
Do. --Calcutta.
Do. —N.-W. F. Province.
Bombay Tramway Company—(four Rollers, repeat orders).
Military Works—N.-W. Frontier Province (five rollers)
Calcutta Corporation
Indian Iron and Steel Co.
Lucknow Improvement Trust.
Poona Turf Club.
Sappers and Miners, Roorkee.
Nepal State.
H. H. Maharao of Cutch,

Erection and Instruction.

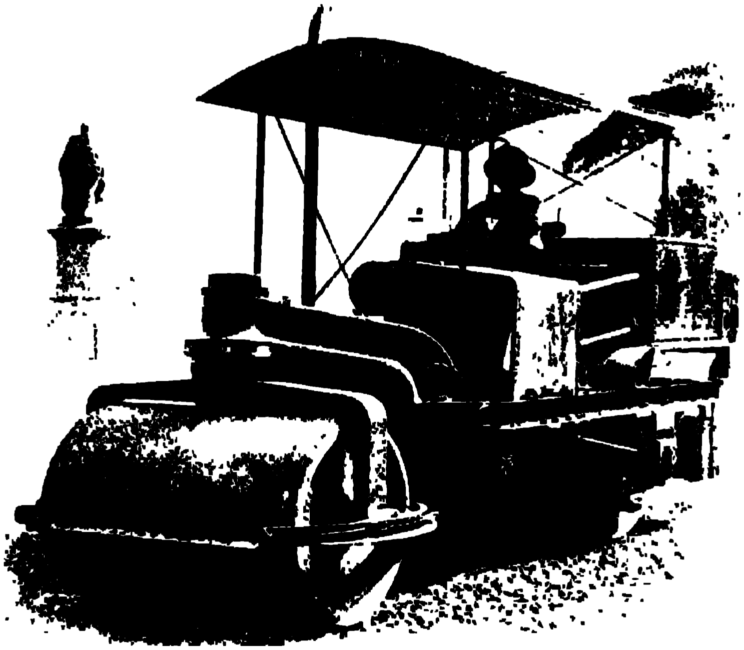
We are always pleased to fit up and hand over rollers in working order when desired and we have a staff of experienced erectors for this purpose. The erector can, by arrangement remain and train the buyer's selected driver in working the roller supplied. If it is preferred we can quote inclusive rates for handing over rollers in working order at the buyer's station.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

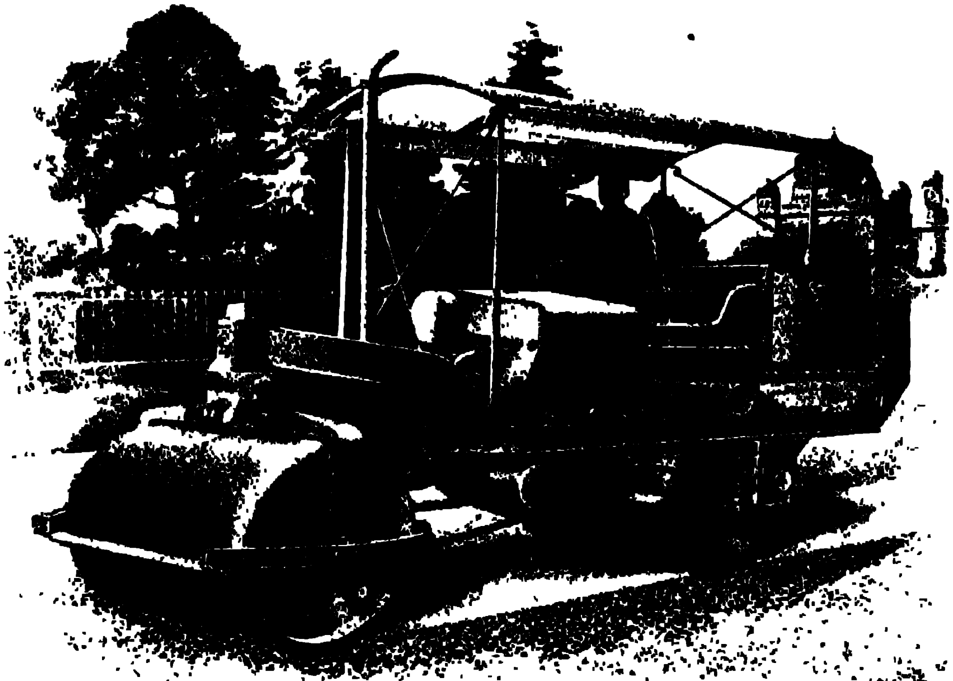
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Pioneer" Motor Rollers in India.



Motor Roller supplied to Calcutta P. W. D.



One of several Rollers (repeat orders) supplied to the P. W. D. at Lucknow.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Size "J" Roller, weighing 10 tons in working order and 12 tons with the addition of water ballast.

Sizes and Particulars of "Pioneer" Rollers for Road Work.

Sizes	WEIGHT IN TONS. Empty.	Full	Engine Cylinders	B H P	Width Rolled.	Max. Weight Hauled	Price, Rs.
EW	4½	4¾	2	16	48"	6 tons	9,955
E	5½	6	2	16	48"	6 „	9,780
E2	6½	7¼	2	16	48"	6 „	10,065
*FS8	8	9½	4	22	48"	8 „	11,880
J	10	12	4	30	54"	10 „	13,035
K	11	14	4	35	54"	10 „	14,275

Note.--The B. H. P. is that for working on Kerosene. On Petrol Fuel the E Series will develop 20 B. H. P. and the J. and K. 35 and 40 B. H. P., respectively.

*The FS8 size is fitted with extra tank and Sprinkler for Rear Roller.

Sizes and Speeds of Driving Pulleys.

Sizes of Roller	Diameter.	Width	Speed Max.	Min.
EW E	16"	5½"	450	150
E2	16"	5½"	450	150
FS8	24"	7"	265	155
J & K	24"	7"	265	155

Pulleys will revolve in either direction as required.

"Pioneer" Rollers can be supplied fitted with Sprinkler attachments for Tar macadam roads or with boxes to carry metalling for road patching.

All Rollers are fitted with "Dorman" War Office Subsidy Type Engines.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

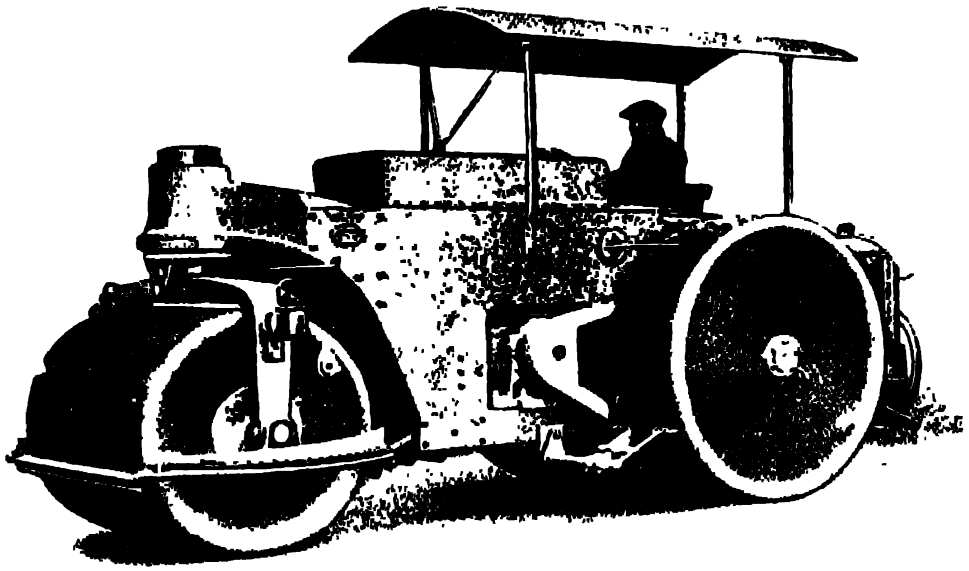
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Three-Wheeled "Pioneer" Rollers.

To meet the wishes of buyers who prefer a three-wheeled Roller, two sizes of heavy rollers have been introduced, designed to meet circumstances for which it may be thought more suitable than the well-known Tandem pattern, and incorporating many of the advantages of the latter. The new machine has side wheels of the large diameter usual in steam roller practice, and embodies valuable features to be found in no other Road Roller. The 40 H.P. Motor fitted is adapted to use petrol or paraffin as required, and is governed to run at a speed of 900—1,000 R.P.M. The power is transmitted to the gear box through a simple cone clutch and flexible couplings.

Variable Weight.—The weight of the Roller can be increased 3 tons by water ballast in both front and back rolling wheels, so that the correct proportion of weight is maintained.



Leading Particulars.

Size.	Nominal Weight.		Horse Power at 1,000 R.P.M.	Width Rolled	
	Empty.	With Water Ballast.			
	tons.	tons.		ft.	in.
T.W J.	10	13	40	6	[illegible]
T.W.K.	12	15	40	6	[illegible]

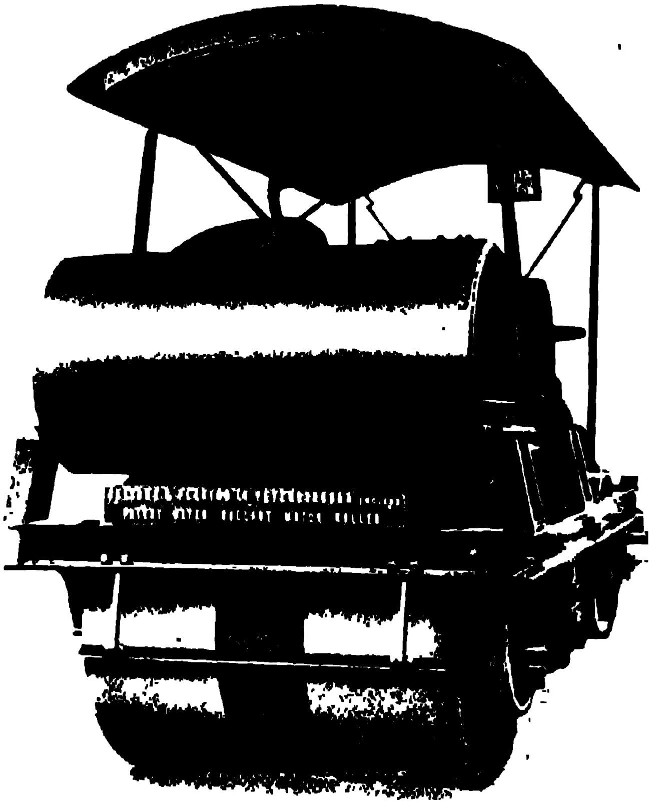
Detailed Specifications will be sent on Application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Pioneer" Rollers, for Hill Roads.



"Pioneer" Rollers have been successfully employed for consolidating hill roads where heavy gradients and sharp curves have to be negotiated. In such cases and when the camber on the road is excessive we recommend that recessed rear rollers should be fitted as a safeguard against skidding. We can, if desired, fit a special protective device consisting of suspended blocks of wood on each side of the rear roller with an arrangement for instantaneously allowing them to fall and "Scotch" the roller if an emergency occurs. We have supplied a number of 12-ton Rollers with recessed rollers for work on the N.-W. Frontier.

Testimonials.

A Municipal user writes as follows:—

With reference to your letter No. Z|J. B F, dated 25th May 1920, I have the honour to inform you that I have been using a Barford and Perkins' E2 size Motor Roller since April 1913 or just over seven years and I have not the slightest hesitation in saying it has given me entire satisfaction. Every road consolidated in the station since 1913 has been rolled with this Roller. I have found it excellent for giving a finish to the road surface.

The only parts that have been replaced up to date are the chain, the chain wheel, two gear wheels, piston rings and springs over front wheel.

As regards working costs, I use 4 gallons of kerosene or ½ gallon petrol, ½ gallon A. oil, and ½ lb. grease per day of six to seven working hours and the cost of this works out to over 20 per cent. less than that of a 10-ton Steam Roller working the same time.

I hope to go in for another Motor Roller as soon as possible.

(We have since received a further order from this buyer.)

With reference to your letter No S|H.O.II. of 9th instant, we have pleasure in supplying you with the following brief notes on our experience with Barford and Perkins' "Pioneer" Motor Rollers.

We originally purchased for trial a second-hand 4-ton Roller in 1917. The results were such as to justify us in increasing the number to 4.

We now own 1—4-ton Roller purchased second-hand in 1917
2—6 ,, ,, ,, new ,, 1920
1—8 ,, ,, ,, ,, ,, 1920

All are working well and giving entire satisfaction.

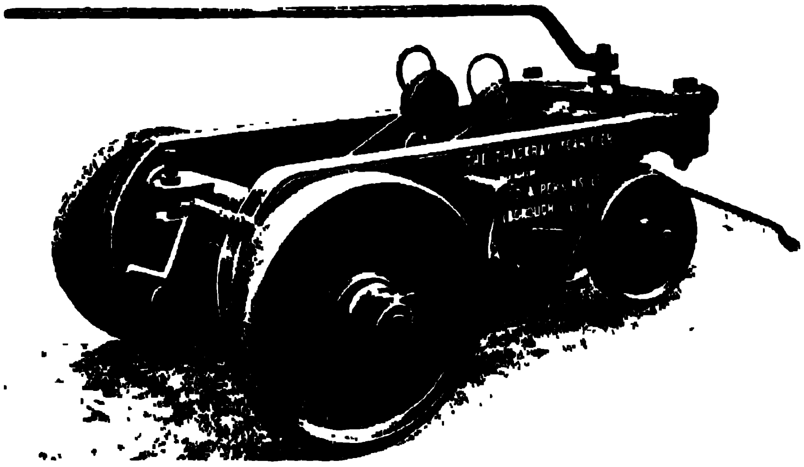
Yours faithfully,

For The Bombay Electric Supply & Tramways Co., Ltd.,
(Sd.) C. L. MOBERLY,
General Manager.

Light Road Rollers.—For special cases such as rolling grass and garden paths lighter rollers than those listed can be offered but they are not recommended for road consolidation.

Running Costs.—The cost of running varies with the locality, price of fuel and rates of wages. Generally the fuel consumption can be safely estimated not to exceed three-quarters of a gallon per hour for any of the E. series of Rollers and one and a quarter to one and a half gallons per hour for the "J" and "K" sizes. About one to two gallons of Petrol is required per week for starting up a Roller. The greatest economy with Motor Rollers is due to the reduction of labour charges.

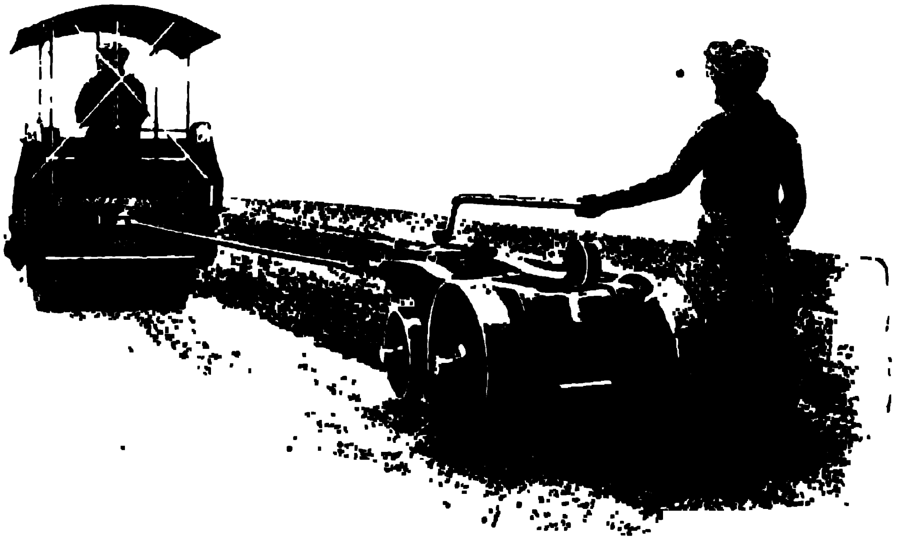
Road Scarifiers.



We stock two sizes of Scarifiers for use with our Motor Road Rollers. The smaller is fitted with two tynes and is suitable for all sizes of rollers up to the " F.S.8 " (9 tons weight) Roller. The larger size has four tynes and is recommended for " J " and " K " size rollers. It should be noted that in both cases only half the number of tynes should be used at one time, the balance being kept in reserve to be used while the original ones are being re-pointed.

The scarifiers are not attached directly to the rollers as a rigid connection is found to be undesirable. The attachment is made by means of a length of cable connected at one end to a Spring Draw Bar which is fitted to the rear traverse member of the road roller frame and at the other end to the scarifier through a Spring Hook. The complete attachment therefore consists of four parts: Spring Draw Bar, Cable, Spring Hook and Scarifier.

Roller and Scarifier.



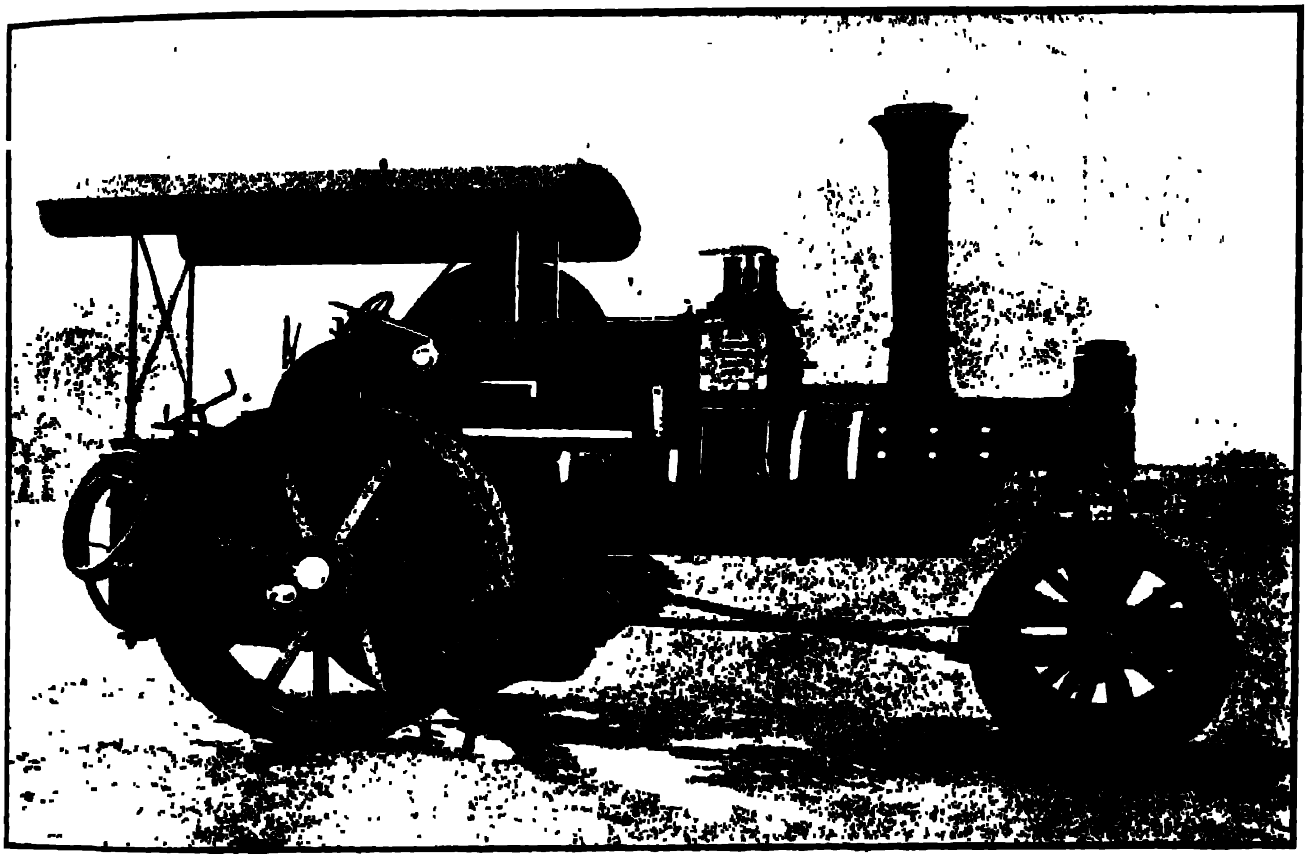
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Steam Road Rollers.

Single and Compound.



In some circumstances oil fuel is not readily obtainable, but wood as fuel can be obtained for the cost of collection and in such cases the Steam Road Roller has undoubted advantages.

We can supply Steam Road Rollers of well-known makes, both single cylinder and compound types and shall be glad to send detailed specification on request.

Size and Type.	Single Cylinder.			Compound Type.		
Tons		10	15		10	15
Diam. of Cylinder	6¼"	7½"	8½"	H.P. 4¾" L.P. 8¼"	H.P. 5¼" L.P. 9"	H.P. 5¾" L.P. 9¾"
Length of Stroke	9"	10"	10"	9"	10"	10"
Front Roll, diam.	3' 2"	3' 9"	3' 9"	3' 2"	3' 9"	3' 9"
„ „ width	1' 10¾'	2' 0"	2' 4½"	1' 10¾"	2' 0"	2' 4½"
Rear „ diam.	5' 0"	5' 6"	5' 6"	5' 0"	5' 6"	5' 6"
„ „ width	1' 3"	1' 4½"	7½"	3"	1' 4½"	1' 7½"
Total width rolled	5' 11"	6' 6"	7½"	6' 1½"	6' 6"	7' 7½"

Full particulars and prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS.

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Phoenix" All-Steel Stone Breaker and Ore Crusher.

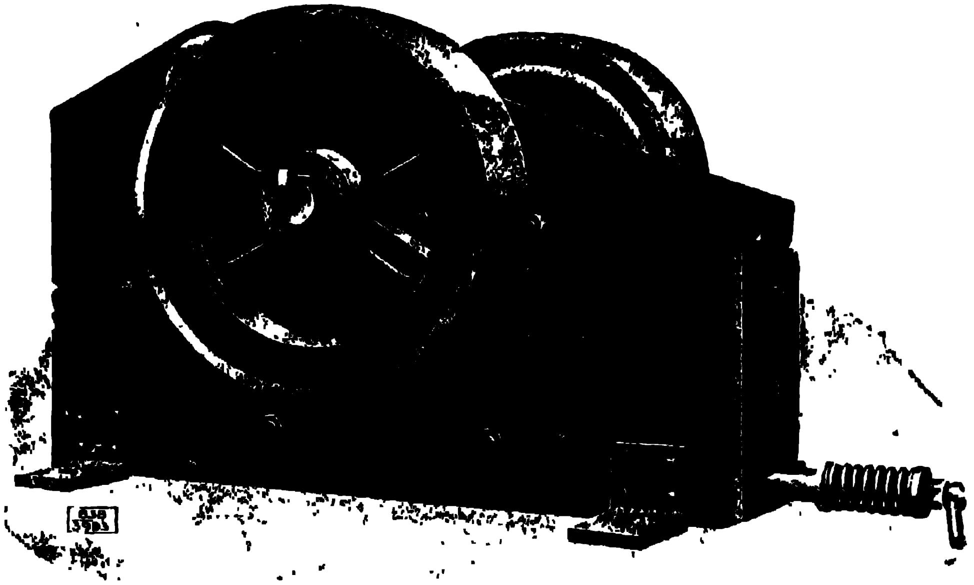


Figure 1·

The disadvantages of the ordinary type of stone breaker and ore crusher are well known to users of these machines. Notwithstanding their excessive weight—which makes them awkward to move from place to place—they are nevertheless very liable to breakage owing to the tremendous strains which the nature of their work transmits to the body of the machines. Steel, having a tensile strength many times that of cast-iron, enables the designer to give greater strength and to save in the weight of material used.

The illustration represents the most simple form of Crusher made for the treatment of ores, quartz, road metal, railway ballast, cement, etc.

The Frames are made of rolled steel plates in place of the usual heavy cast-iron frames, thus securing the greatest possible strength, and a considerable saving in weight.

The Jaws are manufactured of a special mixture of metal for obtaining the greatest hardness and durability and being **reversible** they last much longer than the old-fashioned jaws supplied with other machines. The mechanical arrangement is the "toggle" movement, which exerts an enormous force at the crushing jaws for a small force on the pulley.

All the shafts are of the best material and turned to gauge.

The Bearings are of extra length, of Babbit metal, provided with dust-tight oil boxes of large capacity.

Two Flywheels of heavy section are provided, turned on face for belt drive and the machine can be driven from either end.

The Drawback Gear is of simple design, provided with an improved buffer, which relieves the working parts from all shocks.

This type of machine has been largely adopted at home and abroad and we have supplied considerable numbers to Indian Railways, the P. W. D. and other users.

The chief features of the machine are its simplicity, large crushing capacity, accessibility, ease of erection, small power required to drive, small number of working parts, ample means of lubrication, and adjustment for wear.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Phoenix" All-Steel Stone Breaker and Ore Crusher.

This represents a machine fixed on a stone base with a steel plate screen driven from the crusher shaft. These machines can also be supplied in a portable form as shown in Fig. 3.

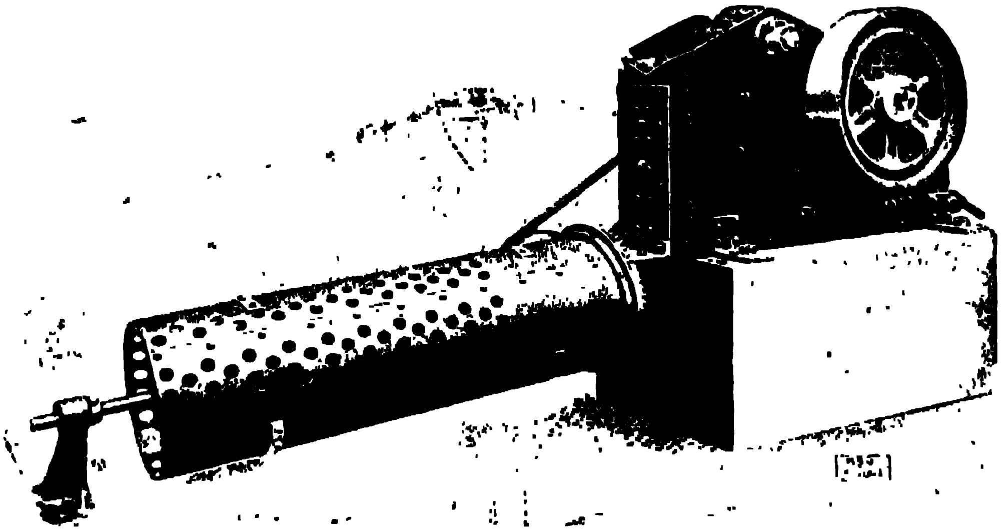


Figure 2.

Sizes, Horse-Powers and Duties of the Improved "Phœnix" Stone Breakers.

Size of Machine at the Mouth	ins.	9 × 5	10 × 7	12 × 8	16 × 10	20 × 10
Quantity broken to road metal Size and under per hour	tons	**3**	**4¼**	**5**	**7½**	**10**
Actual or Brake H.P. recommended .	..	5½	8	12	16	22
Revolutions per minute .. .	..	275	275	275	275	275
Size of Driven Flywheel .. .	ins	27 × 4½	27 × 4½	34 × 6½	34 × 7	34 × 8
Weight of Machine (Fig. 1) ..	tons cwts.	1-10	1-15	3-8	4 15	6-0
Weight of Automatic Screen .. .	cwts.	5	7	7	10	13
Weight of Wheels, Axles and Shafts ..	tons cwts.	0-10	0-16	1-5	1-8	1-10
Price of machine without Screen and Wheels	**Rs.**	**1,820**	**2,400**	**2,965**	**3,875**	**4,600**

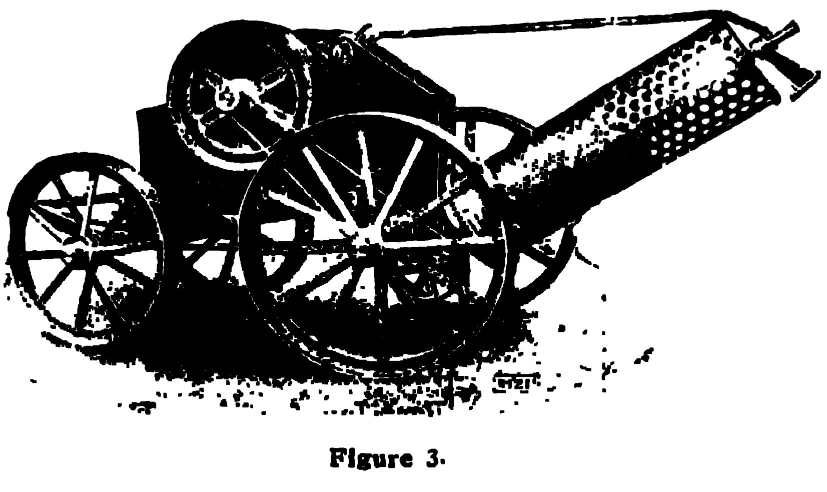


Figure 3.

When supplied with screen attachment the holes will be for screening to road metal size, *viz.*, 2¼ ins.

We stock these machines with and without screen attachments and in fixed or portable types.

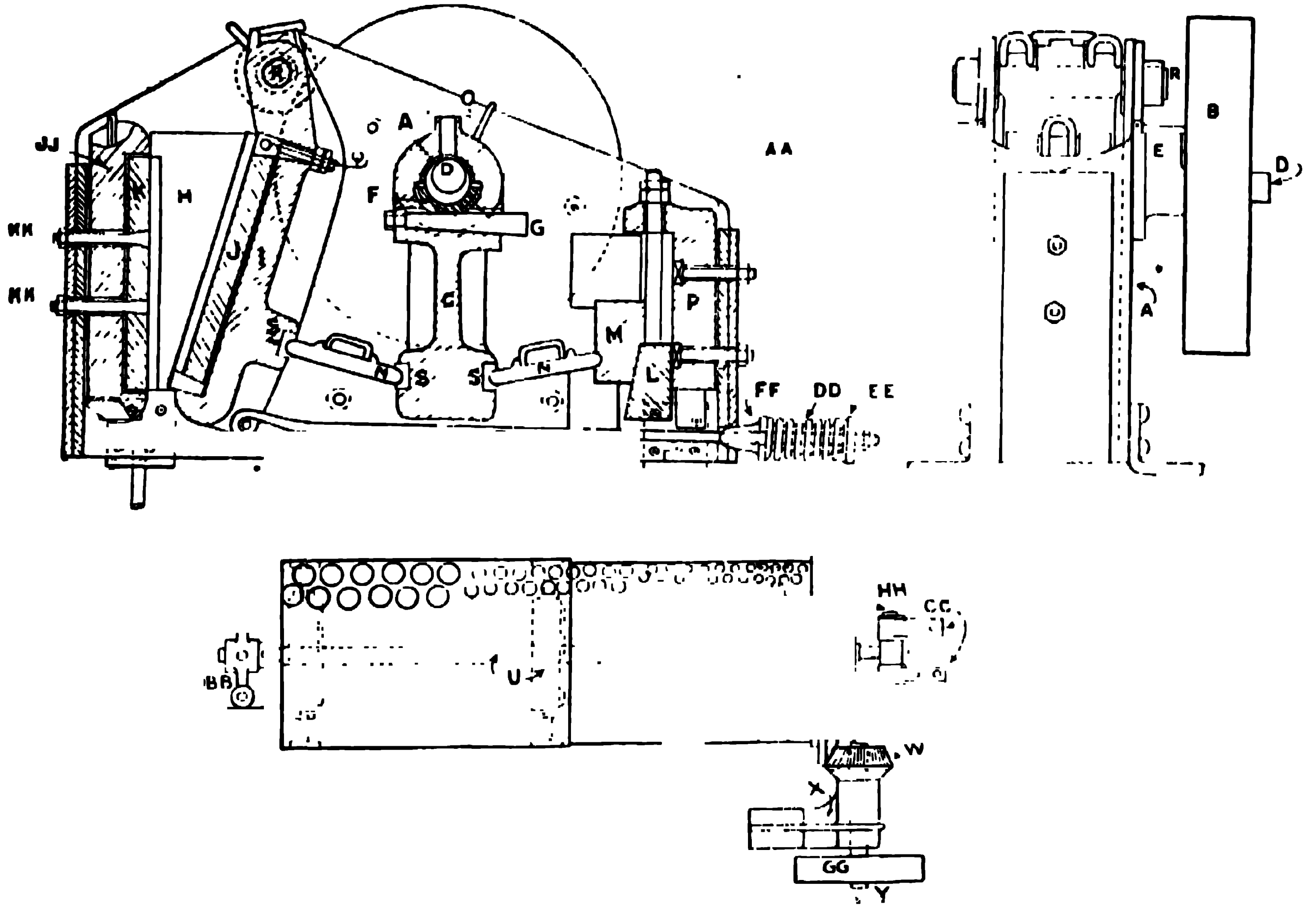
We also stock all wearing parts which may be required from time to time.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

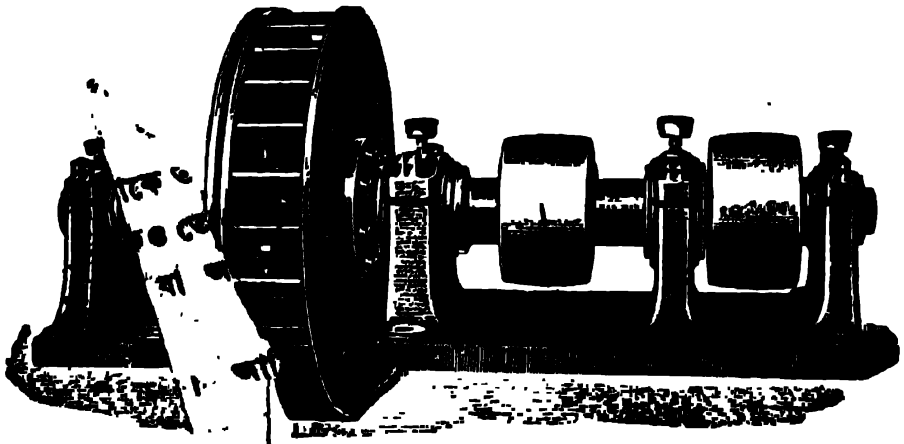
"Phoenix" All-Steel Stone Breaker and Ore Crusher.



Parts for Steel Frame Stone Breaker.

Reference Letter.	Machine Parts.	Reference Letter.	Machine Parts.
A	Frame Side.	S	Steel Liners.
B	Flywheel.	T	Screen.
C	Pitman.	U	Screen Shaft and Centres.
D	Pitman Shaft.	V	Bevel Wheel.
E	Pitman Shaft Bearings.	W	Bevel Pinion.
F	Pitman Step.	X	Bracket for Pinion.
G	Cotter.	Y	Shaft for Pinion.
H	Cheek Plates, Steel.	Z	Drawback Gear.
I	Swing Jaw.	A A	Screen Pulley on Breaker.
J	Loose Face (for Swing Jaw I.).	B B	Back End Bearing.
K	Loose Face (for Fast Jaw J. J.).	C C	Front End Bearing.
L	Screw Wedge.	D D	Buffer Spring.
M	Toggle Block.	E E	Spring Cap.
N	Toggles in Machine.	F F	Spring Plate.
O	Oil Cup Cap.	G G	Screen Pulley.
P	Distance Piece.	H H	Pin for Joint End Bearing.
Q	Wedge Bolt.	J J	Fast Jaw for Loose Face K.
R	Swing Jaw Shaft.	K K	Bolts for Securing Loose Face K.

Coal Grinding Disintegrators.



We illustrate above th[illegible] of Disintegrator which is almost universally used in English Collieries for grindi[illegible] for coking purposes. These Disintegrators are made in all sizes up to machines wi[illegible]acity of 600 tons per day. The machine, as illustrated, is shown without any casing [illegible]per, but this is included in the prices given below. If the coal is to be reduced to an [illegible]palpable powder as for Briquette making we recommend a Christy and Norris Disintegrator to be used in conjunction with the above but this is not necessary for coke making.

Specification.—Beds of Cast-iron of heavy design bored at one setting fitted with heavy planed keeps with Oil Boxes and Oil Pipes.

Steel Studs and Lock Nuts. Steel scrapers fitted. Gun-metal Bearings of Admiralty mixture bored, turned outside and fitted.

Cages of steel plate, machined all over and balanced, holes bored and broached for bars.

Beater Bars of special mixture steel, turned at ends and riveted to plates and rings.

Rings machined all over.

Periphery Scrapers fitted of special design.

Shafts of mild steel turned, with sunk keyways and keys fitted.

Pulleys with rounded faces, machined and fitted to shafts.

Casing of iron fitted over cages, with hopper at feed mouth. Bolted in halves for access to ca[illegible]es.

D[illegible] carrying cages, of cast-iron bored and keyed to shafts, bolted to discs and balanced.

Particulars and Prices.

Size.	Daily Capacity.	B. H. P.	Revolutions.	Prices.
2' 0"	36 Tons.	12–16	600	Rs. 2,200
*2' 6"	54 „	16–20	600	„ 2,700
*3' 6"	120 „	40–50	500	„ 3,450
4' 0"	240 „	50–55	450	„ 3,700

Capacities given are for 12 hours and depend on the hardness of the coal. The coal fed into the Disintegrators should not be more than 3-inch cube.

**Note.*—These Machines are generally supplied with the pulleys on one side of the machine. The illustration shown gives a general idea of the machine but is not to be considered as binding.

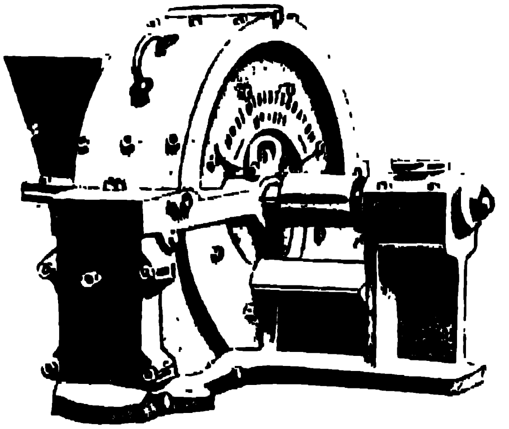
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

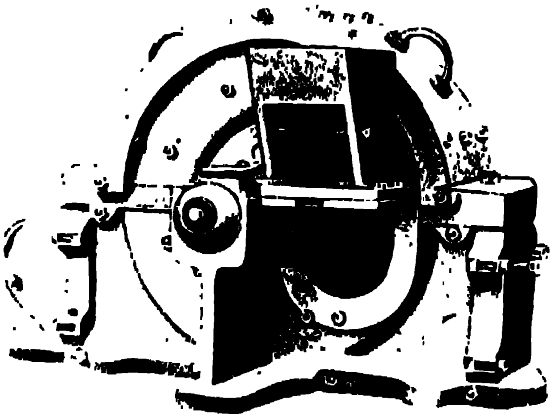
JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Disintegrators.

Carter Principle. By the Original Makers, Christy and Norris.





Highest Award at the United Provinces Exhibition, Allahabad, 1910-11.

Messrs. Christy and Norris have made a speciality of Disintegrators for 50 years, and have constructed many thousands of machines. The Disintegrators designed by them may therefore be relied upon as the very best that experience can suggest. The Christy and Norris Disintegrator is to be found in every part of the world, and they have given universal satisfaction.

Description of the Christy and Norris Disintegrators.

The Principle is exceedingly simple, the whole of the grinding being done by four arms or beaters which, revolving at a high speed in an enclosed chamber, strike the material as it is fed in, reducing most of it to powder which instantly passes out through the screens placed in the bottom half of the machine, that which is not sufficiently fine being again struck by the beaters and further reduced. The current of air created keeps the material cool as well as helping it to pass out quickly. The grinding is, therefore, exceedingly rapid; in fact, one of these Disintegrators, if compared weight for weight with an edge runner, will grind ten to fifteen times as fast, at the same time giving a much more even sample, while for many materials it is the *only* method of successful treatment.

The Range of Work they cover is also almost unlimited, being equally suitable for grinding such tough materials as leather, horns, or green bones; hard materials such as marble chips, or even flint for chicken-grit (though on this latter material, there is, of course, considerable wear), and such light materials as paper and feathers in addition to corn and all classes of feeding-stuffs, chemicals, drugs, etc. **The same machine is capable of dealing with all the above materials absolutely without any alteration other than the mesh of the screens through which the material has to pass to produce the fine or coarse sample required.**

The Construction of the machine is very substantial and at the same time extremely simple in design having only one revolving part, and this needs no adjustment whatever.

The Bearings are of Phosphor-Bronze, and having self-lubricating rings dipping into an oil bath will run for weeks without attention.

The Body of the Disintegrator is of cast-iron with renewable chilled linings. The smaller machines have solid chilled bodies. The linings are of the maker's well-known corrugated type which have been found by experience to give by far the best results on all classes of grinding. Special hard plain linings are supplied for Soorkie grinding.

The Revolving Disc is also of cast-iron with four beaters held in with cotter bolts, except in the two smaller sizes in which the Disc and Beaters are forged in one piece.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY. LONDON.

Christy and Norris' Disintegrators.

Description.

The Beaters which are of Lowmoor Iron faced with hardened steel, are all alike, perfectly straight and interchangeable, and being balanced by a special process can be replaced years after the machine has left the works with the certainty that when the new beaters are put in, the machine will run in perfect balance, an important point to consider in the economical running of a machine of this type.

The Screens are of two kinds, *viz.*:—

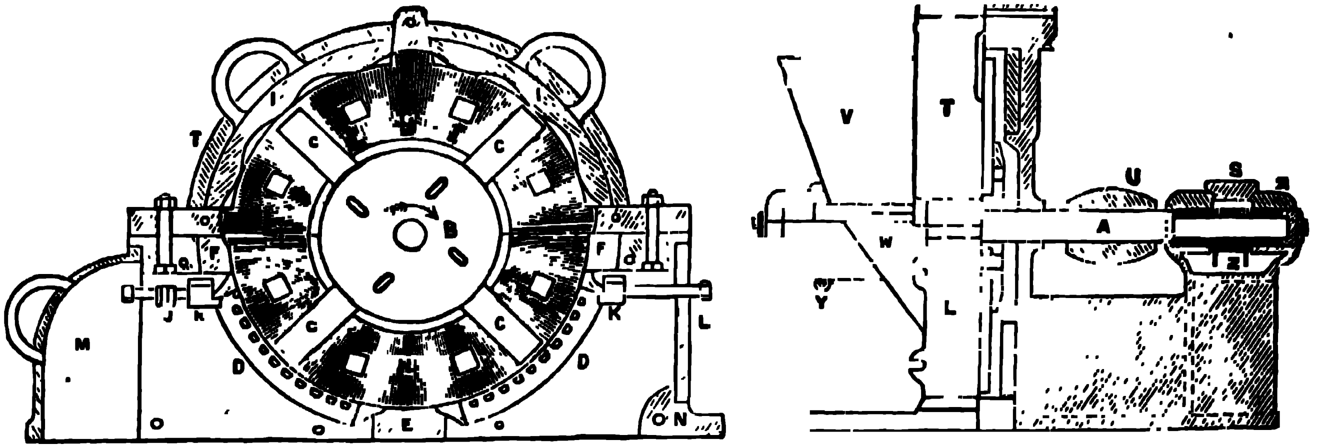
(1) **"Cast-Iron Screens,"** made with cast-iron sides and steel bars. These are suitable for soft materials and fine grinding, the meshes being from 1/40 of an inch up to 3 inches. The bars in these screens cannot be replaced. This is the type which we regularly stock:

(2) **"Steel Screens,"** which are made entirely of steel, are suitable for hard tough materials such as horns, bones, etc., but they cannot well be made of a finer mesh than ¼ of an inch owing to the special method of construction. The bars in this type of screen when worn can be taken out and replaced with new ones at a small cost.

A mofussil constituent to whom we supplied several No. 2½ sizes of this machine wrote as follows:—

"The Disintegrators purchased from you are working excellently well and their outturn per day in March is 500 c. ft. of dry mixed mortar each."

Section of Disintegrator **(Showing Renewable Parts.)**



A. Spindle.
B. Disc or Hub.
C. Beaters.
Note. These two are in one forging for the No. 0. and No. 00.
D. Screens.
E. Bottom Screen Block.
F. Top Screen Blocks.
G. Top Renewable Linings.
H. Bottom Renewable Linings.

I. Top Door Linings.
J. Wrought-Iron Cross Bar.
K. Cast-Iron Cross Bars.
L. End Door.
M. Special End Door.
N. End Door Block.
O. Phosphor-Bronze Bushes.
P. Spindle End Collars.
Q. Oil Box, Pulley Side (old type).

R. Oil Box, Feed Side (old type).
S. Oil Box Caps.
T. Top Doors,
U. Pulley.
V. Hood or Feed Cover.
W. Bonnet on Feed Hopper.
X. Bearing Caps.
Y. Oil Box Plugs.
Z. Rings for Bearings.

The above sectional view clearly shows the construction of the Disintegrators. When ordering spare parts constituents should quote the number on the nameplate of the machine.

Spare Parts.

It is important to note that we carry large stock of spare parts for Christy and Norris' Machines. The wear being heavy under normal conditions, an efficient spare part service is a great help to users.

Christy and Norris' Disintegrators.

General Remarks on Fixing and Working.

The following general remarks may be useful to intending purchasers. We are always pleased to advise our constituents as to the best method of fixing the machines in their buildings:—

Fixing.—It is important that the machine be carefully and firmly fixed and that a belt of first-class quality be used. By attention to these points, perfect running is obtained from the commencement and satisfaction ensured.

Screens.—We do not recommend the regular use of very fine screens owing to the smaller output obtained, but where fine grinding is required, we recommend the use of coarser screens in the Disintegrator and a dressing machine to sift the material as it leaves the mill: the tailings from this dresser being returned to the Disintegrator to be re-ground. By this method the quantity ground per hour is always increased (in some cases even three or fourfold) without any increase in the power required.

When choosing the mesh of screens, it must be remembered that the hammer-like blow of a Disintegrator produces a considerable percentage of fine powder when grinding friable materials, such as sugar, brick refuse, oyster shells, etc., so that even when using ¼ inch mesh screens in the Disintegrator, it frequently happens that 50 to 75 per cent. of the product is fine enough to pass ⅛ inch mesh. On the other hand when dealing with fibrous materials such as bark, mica, etc., with 1/32 inch mesh screen, a small portion of the product may not pass a 1/16 inch mesh sieve as thin flat pieces sometimes pass edgeways between the steel bars of the screen.

Feeding.—Regular feeding is a desideratum. The machines may be fitted with automatic feeding devices at an extra cost.

Treatment of Ground Material.—It is necessary to have an enclosed chamber under the Disintegrator particularly where dry dusty materials are being ground as the current of air created by the machine would blow the dust about causing annoyance and waste. This chamber should be as large as possible, as it adds to the efficiency; an outlet for the air to a stive-room or "balloon" is also advantageous.

Speed.—It is important that the machine be kept at its full catalogue speed when at work, and to ensure this we always calculate the pulleys so as to give an excess of 10 per cent. in speed to allow for the slip of belts, etc. A direct drive from the engine or line shafting is seldom possible owing to the high speed at which it is necessary to run Disintegrators. A countershaft drive is therefore the only alternative. When Disintegrators are driven by Oil Engines it is desirable to drive to a fast and loose pulley on the countershaft.

Selection of a Suitable Machine.

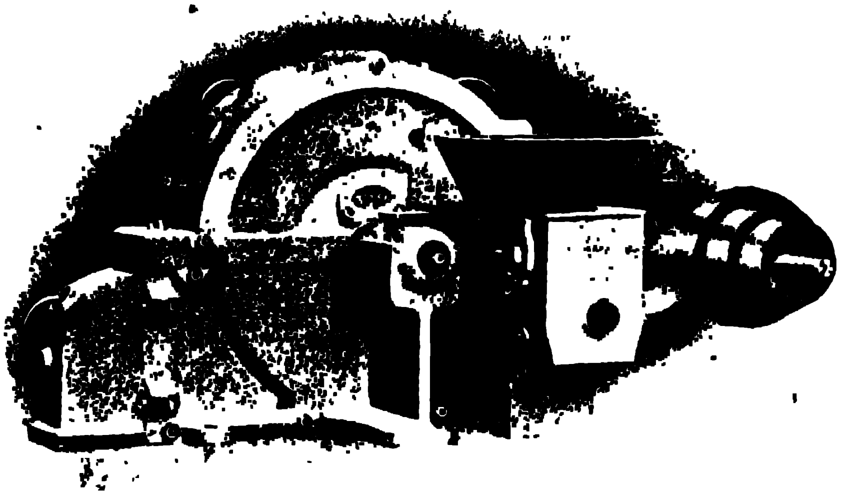
The small sized machines are not recommended for heavy work such as bone-grinding, and the larger machines, though capable of heavy outputs, are not the best machines for fine grinding. Where a large amount of fine grinding has to be done two or more of the No. 2½ size will be found most suitable.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

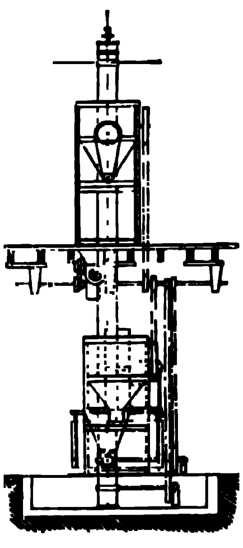
RANGOON, MADRAS,
BOMBAY, LONDON.

Christy and Norris' Disintegrators.

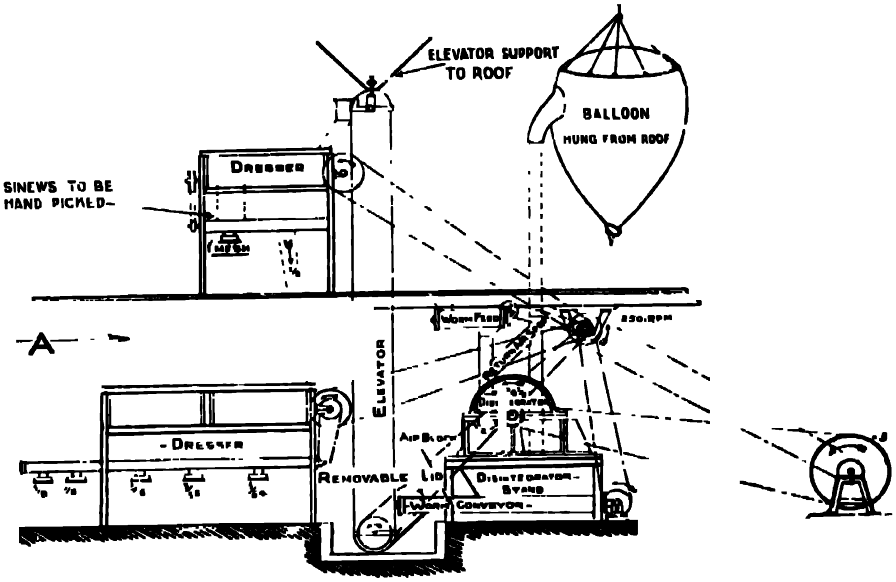


Mechanical Feeds for Disintegrators.

In order to secure regular feeding and the maximum output from Disintegrators it is desirable to fit an attachment for mechanical feeding. Several types of feed attachments can be supplied, the type most suitable in each case depending on the material to be ground. The illustration shows a machine with worm feed attachment and with cone pulley giving three rates of feed.



View Looking in Direction A.



Disintegrators for Bone Grinding.

The Christy and Norris' Disintegrator is very largely used for reducing bones for manure and other purposes. The illustration shows one of several automatic plants of this description, the layout being designed for an Indian Bone Mill in which several units as shown are installed. The ground products are conveyed by a worm to an elevator which feeds two dressers where the products are graded and delivered into sacks.

Special Descriptive Book on Disintegrators on application.

Christy and Norris' Disintegrators.

Table of Output Per Hour.

The Disintegrators grind such an infinite variety of materials that it is quite impossible to enumerate them all. The following selection, however, with the approximate quantities of common materials the different sizes will grind per hour, will be a guide to intending purchasers. Every care has been taken in compiling this list, but we cannot bind ourselves to these figures as the capacity so largely depends on the condition and the quality of the material. A detailed list covering 200 different substances will be sent on application.

Materials.	Christy and Norris' Disintegrators.						
	Screens used.	No. 0.	No. 00.	No. 1½	No. 2½	No. 3½	No. 4½
	Inch.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.
Asphalte ..	1/4	..	..	..	22	45	70
Bark, Valonia	1/16	..	5	10	18	25	..
„ Quilla	1/16			5	9	13	..
„ Mimosa	1/2		8	10	18	25	60
„ Oak	1/4	..	6	7	13	22	50
„ „	1/2	..	10	15	22	39	90
„ Fir	1/2		1½	2	3½	6	..
„ Pine	1/16	.	4	5	9	15	30
Bones, Boiled	1/8 and 1/4	.	.	7	12	21	50
„ Town collected	1/2	.	..	15	26	45	100
„ Indian or Dry	1/12	.	..	2½	4½	7	..
Brick and Tile Refuse	1/8	.	8	15	25	40	100
Cake for Cattle Food	1/8	4	10	18	30	50	70
Coal	1/2	5	10	18	35	60	100
„	[illegible]	2	5	8	15		..
Cocoanut Fibre	1/32	.	1	2½	4	.	..
Coke and Lime	1/16	3	6	10	18	30	..
Copra	1/8	..	5	8	12	25	40
Lime	1/16	6	10	18	30	55	80
Limestone	1/8	.		7	14	20	50
Mica	1/4	1/8	1/2	3/4	1¼	..	..
Nux Vomica	1/4	1/16	1/12	1/8	1/4	..	..
Pottery Refuse	1/8	..		20	35	60	140
Saltpetre	1/2	4	7	9	16	25	50
Salt (Table)	1/16	4	10	15	25	40	80
Shellac	1/2	4	6	9	15	25	..
Soorkie ..	1/4	..	10	20	35	50	100
Sugar, Crystals or Loaf	1/4	5	8	12	20	35	..
Tiles	1/8	..	.	20	35	60	100

Disintegrators for Grinding Kunkar and Soorkie.

The No. 2½ machine is very popular for grinding Soorkie and Lime and when used for this purpose the best results are obtained with plain linings instead of the corrugated type.

A No. 2½ machine will grind approximately 70 to 80 cubic feet of Kunkar per hour or about 40 cubic feet of Soorkie.

Coal Grinding.—For larger outputs when grinding coal for coking purposes the Carr Type Disintegrator (described on page 431) is preferable.

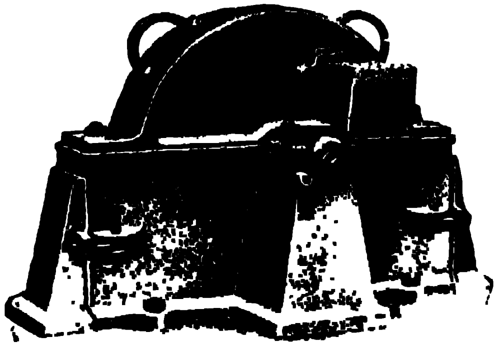
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

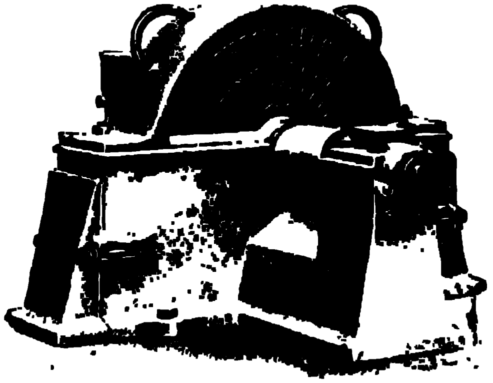
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Christy and Norris' Disintegrators.

1924 Design.





We have recently received particulars of a revision of design embodying several improvements which will shortly be introduced. We illustrate the 17 ins. machine of the new type which takes the place of the No 00.

For detailed descriptions please write for separate lists.

Particulars and Prices.

Size.	No.	0	00	1½	2½	3½	4½
Revolutions per minute		5500	4400	3600	2700	1900	1400
Diameter of Driving Pulley	ins.	3	4	4	6	9	15
Width of Driving Belt	„	3	3½	4½	6	8	10
Size of Feed Hole	„	3½×2¾	6×5	6×6	8½×6½	9½×7	12×10½
Approximate B.H.P. required		4 to 8	8 to 12	10 to 16	16 to 25	25 to 40	40 to 70
Weight packed	cwt.	4½	8	12½	22	40	95
		Rs. A.	**Rs. A.**	**Rs. A.**	**Rs. A.**	**Rs. A.**	**Rs. A.**
Disintegrator with spare Beaters, 4 pairs of Screens with C.-I. Sides and Steel Bars and Spanners		**520 0**	**680 0**	**810 0**	**1,300 0**	**2,165 0**	**3,690 0**
Standard arrangement of Countershaft *		....	**300 0**	**380 0**	**400 0**	**650 0**	....
Extra for Belt Shifting Gear		....	**65 0**	**65 0**	**65 0**	**65 0**	....
Spare Beaters	per set	....	**22 0**	**24 0**	**40 0**	**64 0**	**160 0**
„ Screens, Iron—any mesh	per pair	**8 8**	**15 4**	**17 12**	**30 8**	**54 0**	**84 8**
Top Door Linings	each	....	**4 4**	**6 0**	**9 8**	**13 8**	**22 0**
„ Side „	per set	**34 0†**	**20 8**	**34 0**	**50 12**	**110 0**	**245 0**
Bottom Side	„	....	**20 8**	**34 0**	**50 12**	**110 0**	**245 0**
Top Screen Block	each	....	**2 4**	**2 4**	**3 8**	**4 4**	**6 8**
Bottom Screen Block	„	**1 10**	**2 8**	**2 8**	**4 0**	**6 8**	**10 8**

***The standard shafting consists of a short length of Countershaft, 2 Bearings and C.-I. Brackets, 3 Loose Collars, Pulley for Disintegrator Drive and Engine, with fast and loose pulleys on Countershaft.**

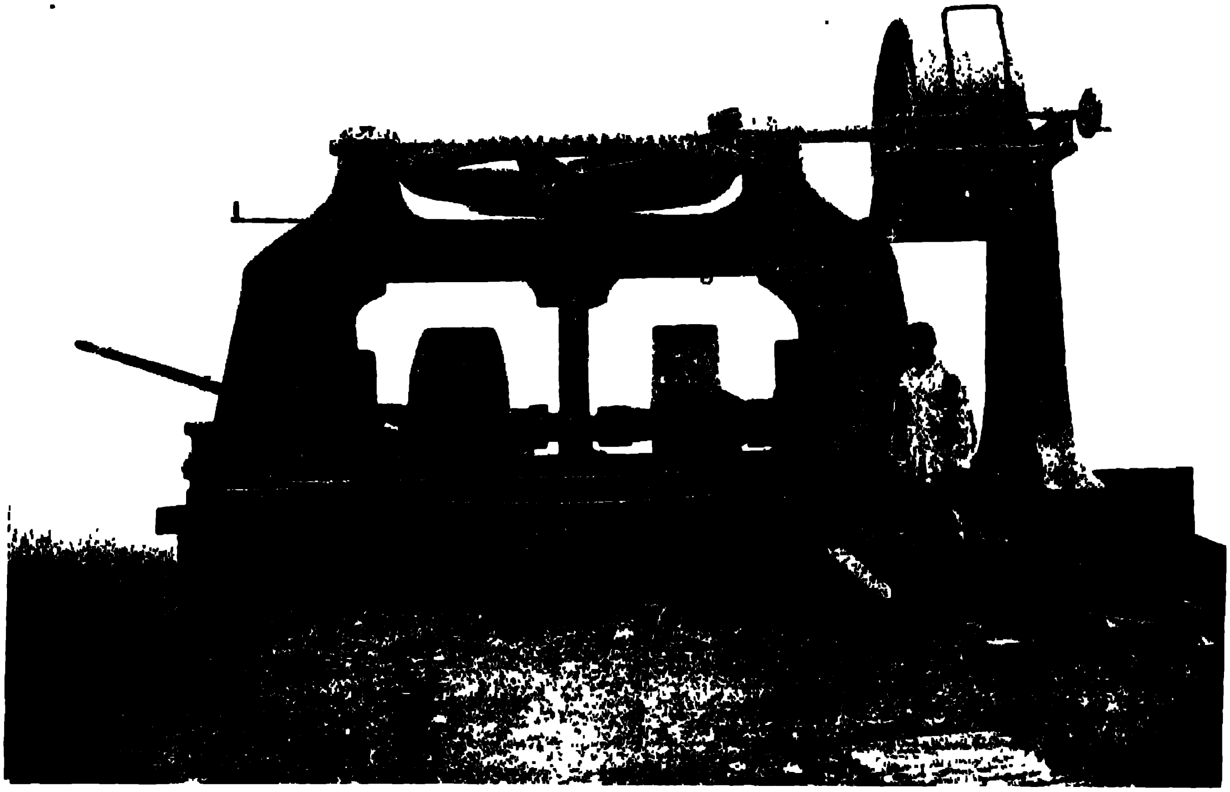
†In one casting for No. 0 machine.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

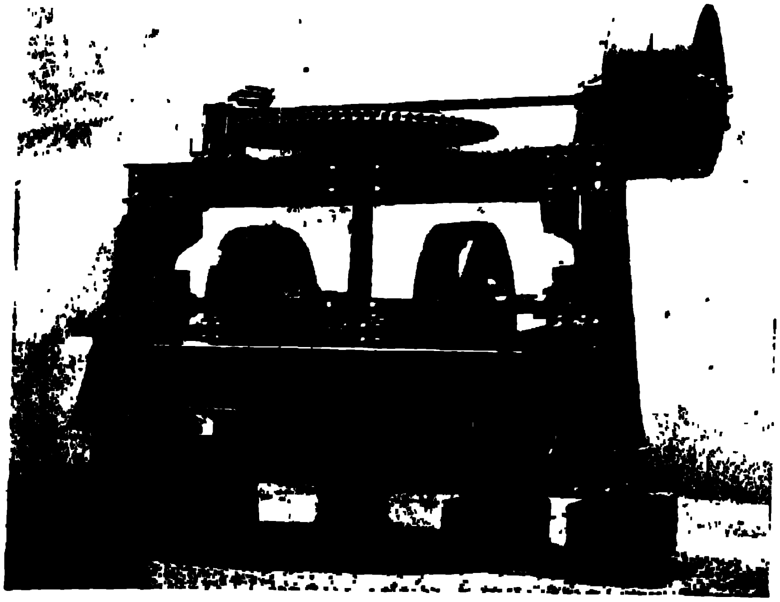
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Grinding Mills.



A Heavy Edge Runner Mill.

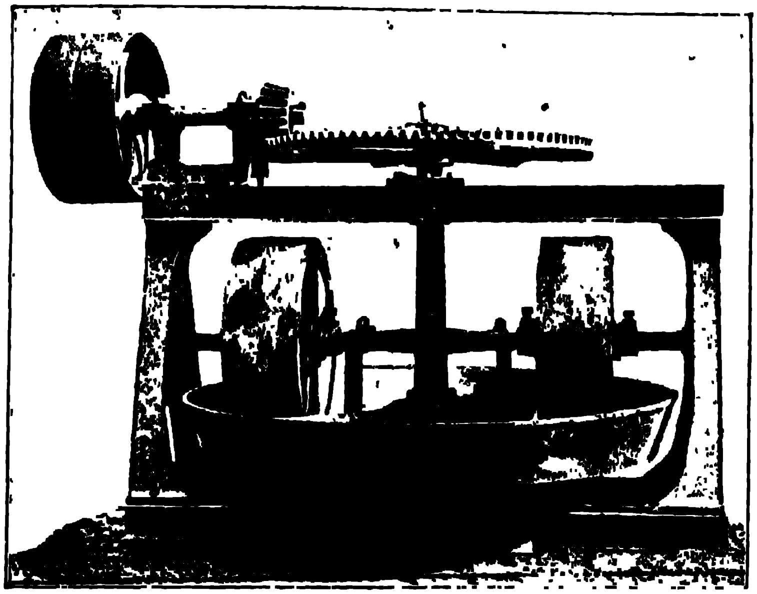


A Silica Grinding Mill.

The illustrations are of two special designs of Edge Runner mills. These were produced to deal with materials of a much more refractory nature than usual. In cases where the ordinary Soorkie mill would be quite ineffectual we can put forward with confidence such mills as are shown for similar extra heavy duty.

Prices on application.

Soorkie Mills.



The mill is constructed with steel frames securely bolted to C.-I. end standards. The bearings are all easily accessible. Efficient scrapers are provided. No metal or wood foundation is necessary, a bed of concrete or brickwork being all that is required. Loose plates for the pan to save the cost of replacing the whole of the pan when worn out on the rolling path can be provided at extra cost.

We have made several smaller mills with 4 feet diameter pans for light work such as Grinding Arsenic.

Usual sizes, 7 and 8 feet diam. Pan

Prices on application.

Where conditions make it more desirable we can supply mills of the Under-driven Type, for grinding such as Foundry Sand, etc.

Soorkie Screens, Galvanized Wire:—

5'×3'×¼" mesh, with wooden frames	per pair	**Rs. 7-8**
Do. do. without frames		**14-0**

Hand Pile Driver.

Complete with Crab, Monkey, Chains, Nippers, Etc.

The frame is made of best Pitchpine strongly framed and bolted together; the monkey is of cast-iron of the weight specified. The crab is single purchase. The machine is provided with sufficient best tested crane chain and self-acting nippers and is in all respects complete and ready to put to work. These Pile Drivers are usually supplied mounted on small rail wheels, so as to be easily moved from pile to pile.

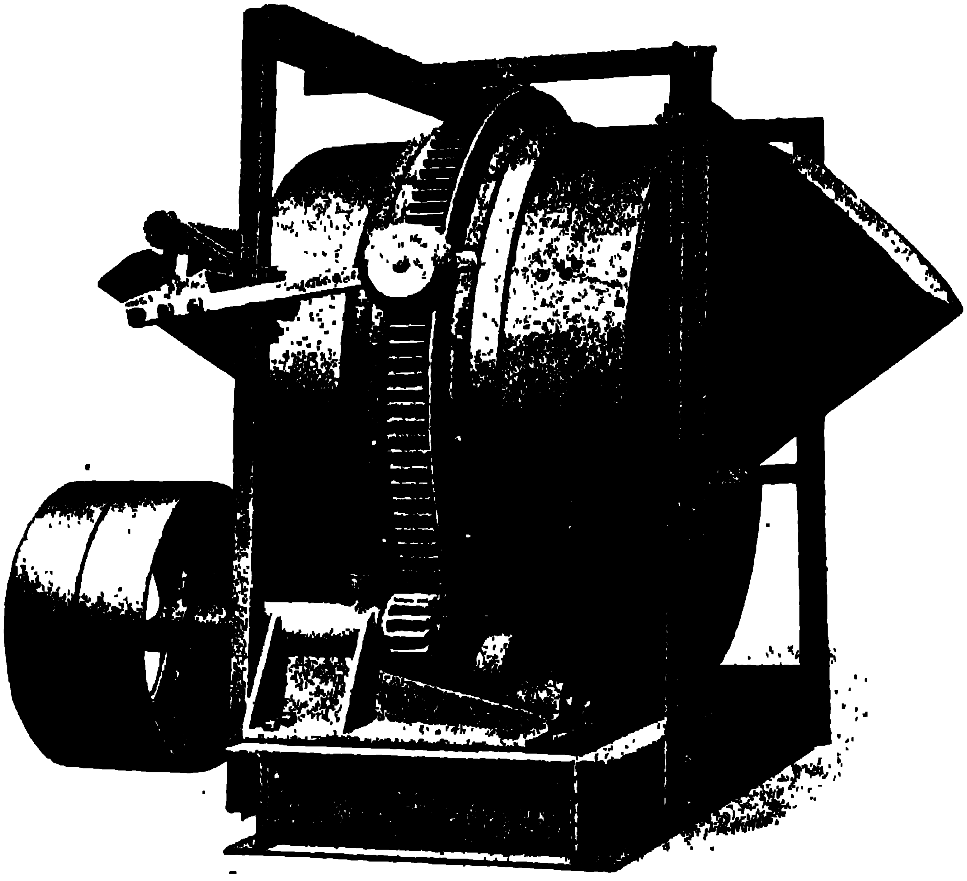
Weight of Monkey.	Complete with Woodwork Frame, 25 feet high.		Extra for 5 feet of extra height.		Complete set of Iron work only.	
	Approx. Weight.	Price.	Approx. Weight.	Price.	Approx. Weight.	Price.
		Rs.		Rs.		Rs.
10 cwts.	37 cwts.	1,835	4 cwts.	172	18 cwts.	1,056
15 ,,	48 ,,	2,200	4¼ ,,	196	24 ,,	1,234
20 ,,	59 ,,	2,590	4½ ,,	220	31 ,,	1,512

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Concrete Mixing Machine.



Standard Victoria Mixer.

Stothert and Pitt, Ltd.

A Concrete Mixer must satisfy the following fundamental requirements:—

1. Thorough mixing of material.
2. A rapid and clean discharge.
3. Avoidance of splashing.

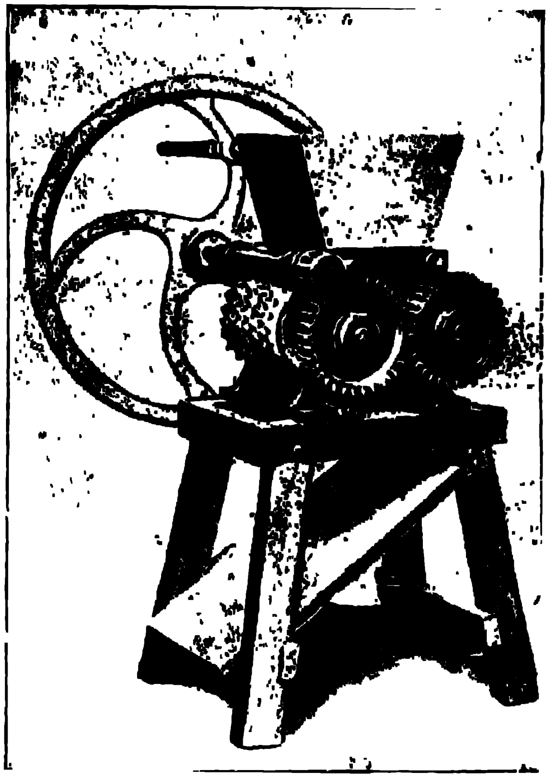
A thorough mixing demands two distinct movements of the mass, first a pouring action to give a constant turning of the batch, and second a strong sidewise movement to avoid vertical strata across the drum.

In the Victoria Mixer the drum has four large hopper shaped blades fixed to the shell, nearly as wide as the drum at the base, with high walls converging at approximately the same angle on either side. As the drum revolves each blade carries round the mass and pours it through a restricted opening back on the drum where it spreads out again, the action constantly repeated fulfils the requirements of a perfect mixer.

A fairly rapid discharge can be obtained by shaping the blades to throw the mass towards the discharge end of the mixer, but splashing then becomes a serious matter, and this is avoided in the Victoria Mixer by making the discharge end concave and arranging the discharge chute to drop in position beyond the blade openings, thus catching every particle of material and causing a clean and rapid discharge. We illustrate the mixer mounted on skids and arranged for belt drive but we are prepared to quote for any type, fixed or portable, independent or self-contained, machines, motor or steam driven.

We shall be pleased to estimate for a suitable type on learning the duty required.

Pug Mills.

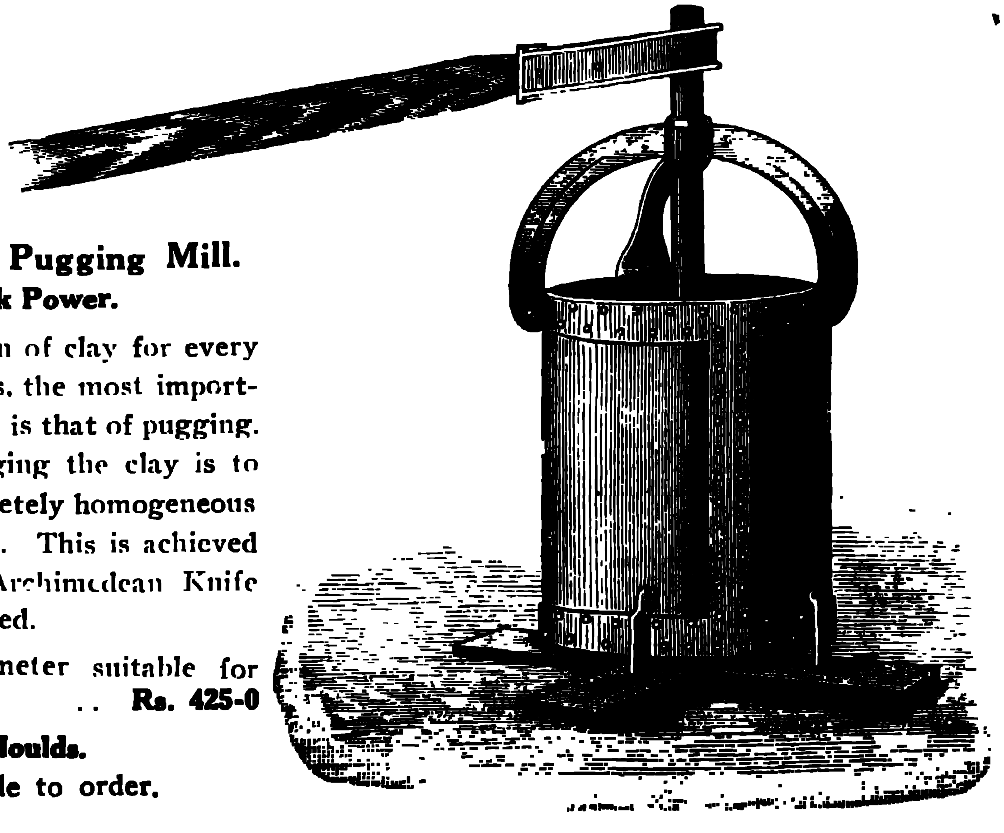


The "Rapid" Pug Mill.

This is a most suitable machine for working in conjunction with the Hand-power Brick-making machine described and illustrated on the following page.

It is easily worked, very effective, and of ample capacity for keeping one Brick-making machine working continuously.

Price, complete with wooden stand. **Rs. 250-0**



Improved Clay Pugging Mill.

For Bullock Power.

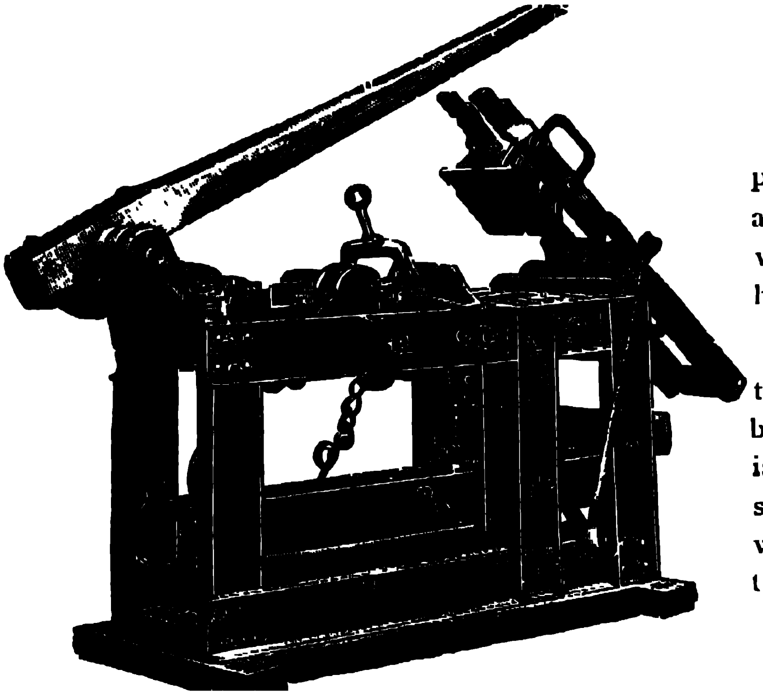
In the preparation of clay for every description of goods, the most important machine process is that of pugging. The object of pugging the clay is to bring it into a completely homogeneous state of consistency. This is achieved by the Improved Archimedean Knife pug mill as illustrated.

Price, 3′—0″ diameter suitable for 2 Bullocks .. .. **Rs. 425-0**

Brick Moulds.
All sizes made to order.

Hand-Power Brick-Making Press.

(Semi-dry Process.)



This is a very useful type of Hand-power Brick-making machine. Strength and simplicity of construction, combined with efficient and expeditious working, have been the aim in designing it.

The machine makes at one operation two solid tough bricks, suitable for all building purposes. The pressure exerted is from 12 to 15 tons. The improved system of leverage gives this pressure without undue exertion on the part of the operator.

The press is specially adapted to treat semi-dry earth which does away with the necessity of spreading the bricks out to dry after they have been pressed and before being burnt or placed in the kiln.

We can supply this machine mounted on wheels for use on road or railway at an extra cost.

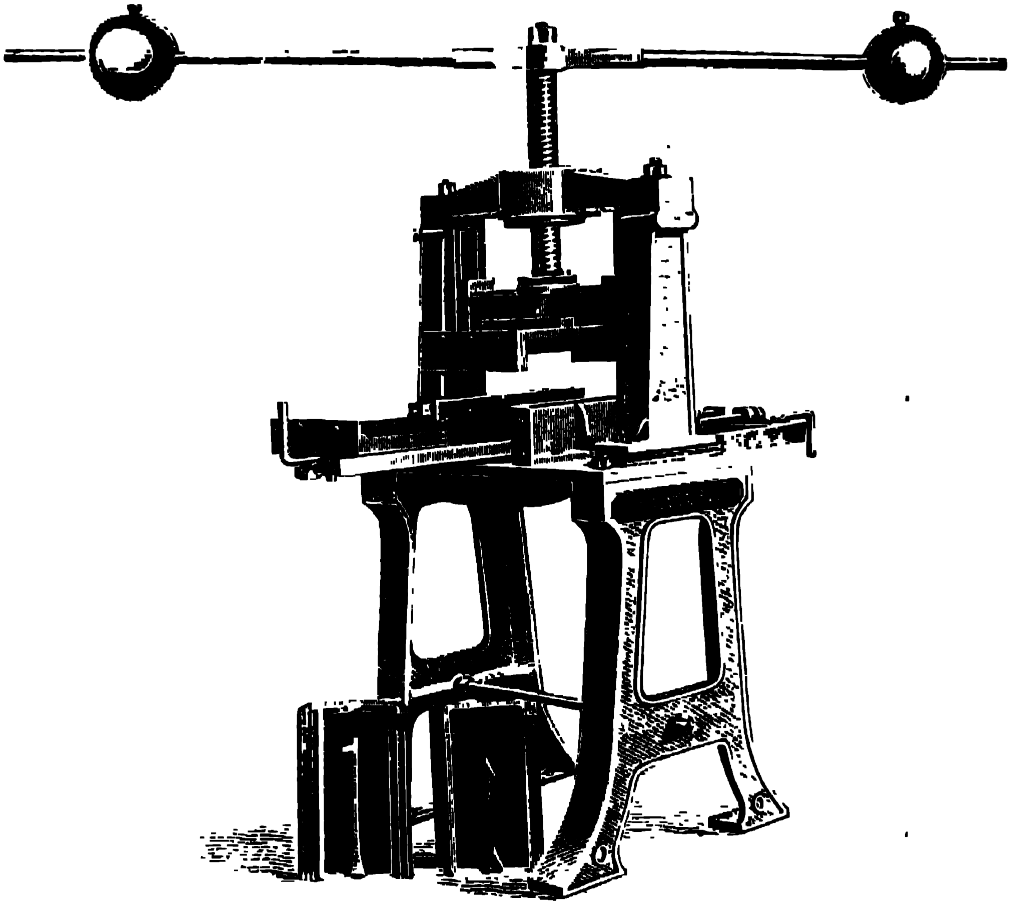
When ordering, please state whether required for plain or other bricks, and give sizes and other particulars. If extra moulds are likely to be required they should be ordered at the same time as the machine, so that they can be fitted to the machine before it leaves our works.

The thickness of the bricks can be varied by screwing up the eye-bolt attached to the chain in the centre of the machine.

Output: 4,000 to 5,000 bricks per day with two operators. **Price, Rs. 900-0**

Tile Pressing Machine.

For Hand Power.



The illustration above represents a useful class of Press for pressing Roofing or Paving Tiles, worked by means of a double threaded screw actuated by weighted lever arms. The two bottom dies are slid in alternately, with the "blanks" or plain slabs of clay upon them and receive in turn the pressure of the top die which descends with great power and rapidity imparting the required pattern to the plain slabs. As the top plate ascends again, one or other die is drawn out and by means of an improved turnover motion deposits the finished tile on to a palette, on which it is taken away to dry, without being touched by the hand at all, the blank tile on the opposite die being pressed meanwhile. By a simple arrangement the bottom dies are regulated to their proper position, and cannot possibly be slid in too far.

The capacity of this machine is large, and it can be supplied with dies for various other patterns of tiles.

The average daily output is about 2,500 per day of 12 hours if kept continuously working.

Price of Press without moulds	**Rs. 750-0**
Price of one set of moulds consisting of one top and two bottom moulds with slides and turnover arrangement for 18 by 12 Mangalore tiles	„ **350-0**
Extra for special tile moulds	„ **105-0**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

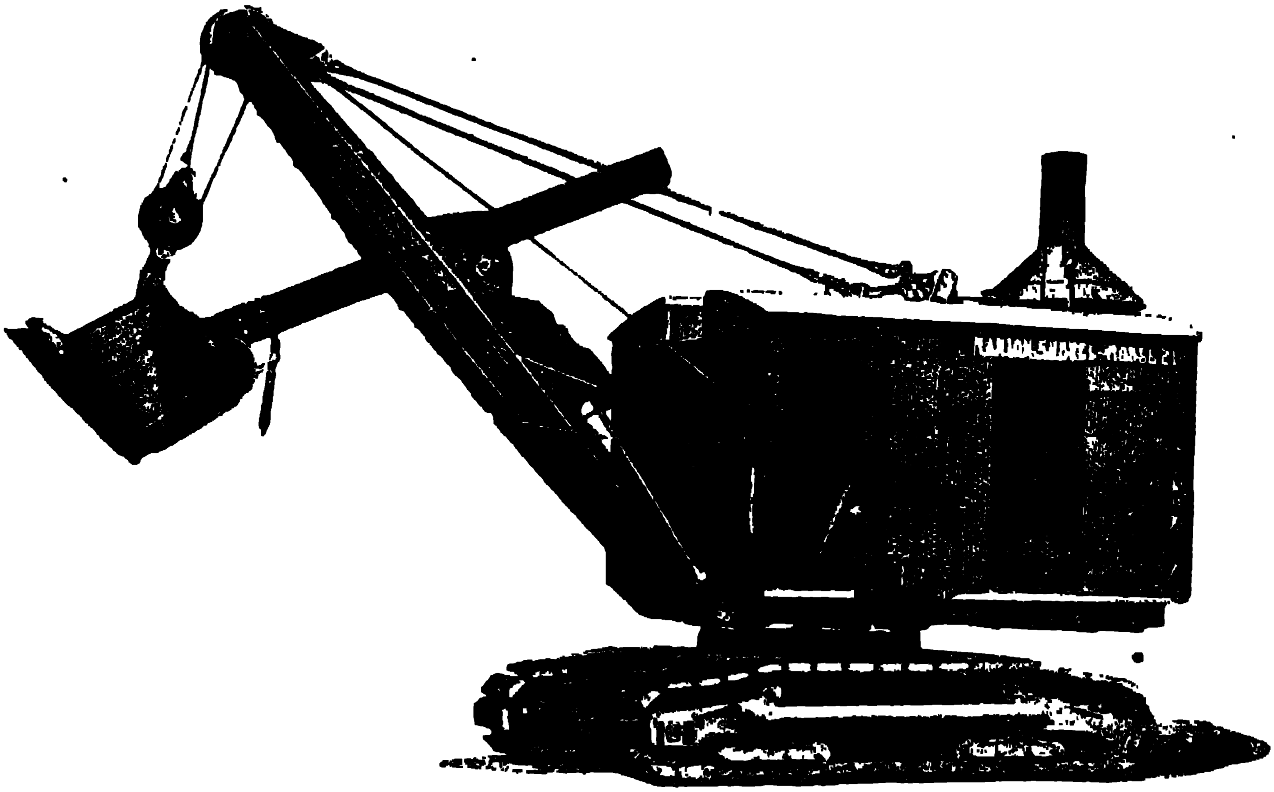
JESSOP & Co. LTD.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Excavating Machinery

By the

Marion Steam Shovel Co.



Small Revolving Steam Shovel mounted on crawling traction trucks.

The efficiency of any Power Shovel is based on four factors: Power, Speed, Capacity and Endurance.

As Sole Agents in India and Burma for the **Marion Steam Shovel Company** we can offer all types of Excavators and Shovels brought to the highest degree of perfection from carefully calculated data of various stresses, strains and loads encountered under actual working conditions. The **Marion Steam Shovel Company,** of Ohio, U. S. A., are easily leaders in this class of machinery in the United States, and we may add throughout the world, and in offering machines and plant of their manufacture—correctly designed, correctly turned out, rigidly inspected and tested by the High "**Marion**" Standard, we can guarantee **Greater Power, Greater Speed, Greater Capacity and Greater Endurance** than has hitherto been possible with Power Shovels of any design or type.

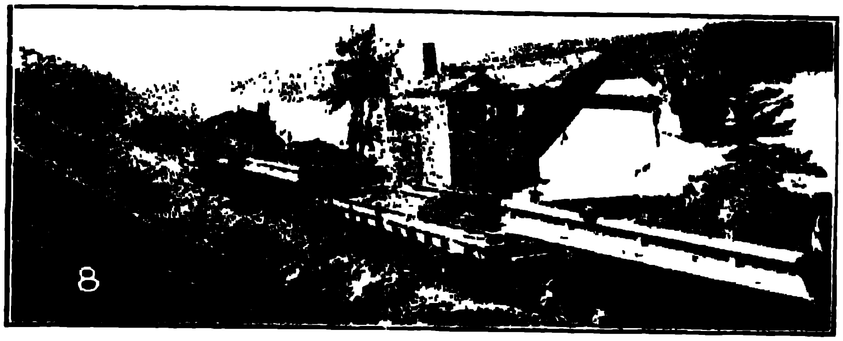
The principal types of Marion Shovels are:—Small Revolving Shovels, Standard Railroad Shovels and Large Revolving Shovels with buckets ranging in capacity from ¾ to 8 cu. yds. From these types a great variety of machines have been developed to enable contractors to take on almost any given type of excavating or material handling work.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Excavating Machinery.



Railroad Ditcher widening cut and clearing side ditches.

Power.

The Marion Excavator or Shovel can be furnished with Steam, Electric or Oil Power.

Mounting.

Marion Excavators and Shovels can be mounted on Two Belt Rigid Crawler Trucks, Four Belt Flexible Crawler Trucks, Steel Traction Wheels, Rubber Tyred Wheels, Flanged railway wheels for all gauges of track, also on Barges or Self-Propelled Floats and Vessels, for reclamation and marine dredging.

Equipment.

The following are a few of the types of equipment:—

- Standard Dipper and Handle.
- Sewer and Trench Shovel with long Dipper Handle.
- Dragline Bucket for stripping and reclamation work.
- High Lift equipment for wide digging and high dumping.
- Crane—easily effected from the Standard or High Lift equipment at site of work.
- Clam Shell and Orange Peel Buckets for all description of dredging.

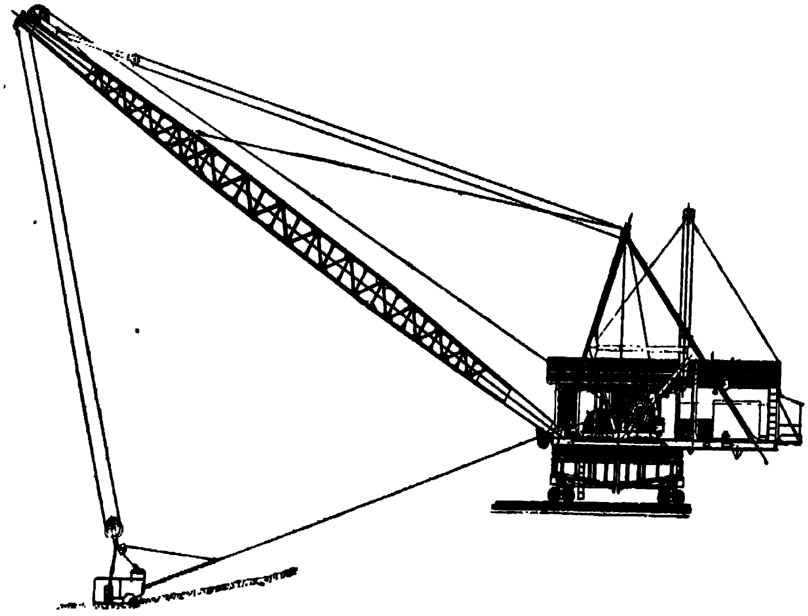
Small Revolving Shovel equipped with Orange Peel bucket loading soft material.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

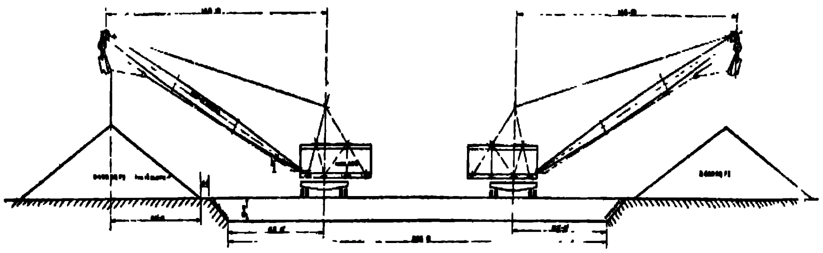
Excavating Machinery.



Model "360" Marion Revolving Dragline Excavator with 150 ft. boom.

Booms of different lengths can be supplied and the size of the buckets increased for shorter booms. The same model can also be fitted up as a Steam Shovel.

(Abbreviated specification on opposite page.)



Sketch of Two Model "360" Marion Revolving Dragline Excavators with 150 ft. booms mounted on trucks as used for excavating wide canals 250 ft. or more The buckets have a capacity of 5 cubic yards each

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Excavating Machinery.

Model 360 Marion Steam Dragline Excavator Specification.

Length of boom	125 ft.	150 ft.
Capacity of bucket	6 cu. yds.	5 cu. yds.
With boom at an angle of 30 degrees—		
Height of dump above top of rail	53 ft.	67 ft.
Radius of dump	125 ft.	147 ft.
Radius of cut in feet	125-145 ft.	147-167 ft.
Depth of cut below top of rail	78 ft.	65 ft.
Extreme height of a frame from top of rail		50 ft.
Length of upper frame		46 ft. 10 ins.
Width of upper frame		21 ft. 8 ins.
Clearance radius rear end of upper frame from centre		33 ins.
Size of beams in upper frame		30 ins.
Diameter of roller circle		30 ft.
Size of lower frame centre to centre of girder		30 ft.
Centre to centre of trucks		26 ft.
Centre to centre of truck wheels		3 ft. 3 ins.
Truck Wheels diameter		2 ft. 6 ins.
Hoisting Engine		14 ft. 16 ins.
Rotating Engine		10 ft. 11 ins.
Size of Boiler		19 ft. by 6 ft. 8 ins.
Heating Surface		1,827 sq. ft.
Type of Grate		Shaking.
Water Tanks capacity		3,200 galls.
Hoisting Cable		1¼"
Drag Cable		1¾"
Boom Hoist Cable		1⅛"
Approx. working weight with ballast		875,000 lbs.
Ballast required for upper frame		125,000 lbs.

Minimum figures given for radius of cut are same as for radius of dump. Maximum figures are based on throwing bucket 20′—0″.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Excavating Machinery.

In order to handle enquiries properly in the initial stage the following information should be furnished:—

Nature of soil to be worked.

Whether irregularities such as boulders, tree stumps, etc., are to be encountered.

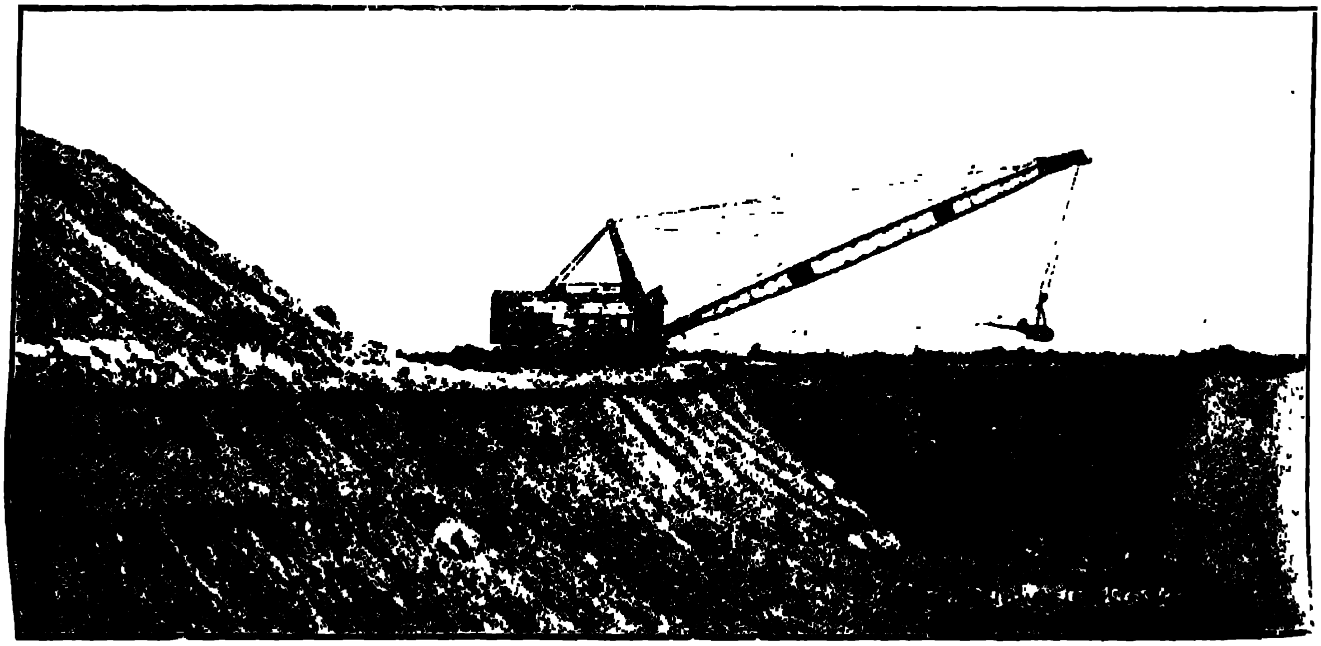
Whether material to be excavated has to be lifted from below the level of track or ground on which the excavator works.

Quantity of material to be excavated daily and length of working day.

Section of proposed excavation showing position of dump for material lifted.

Whether excavator is to be worked by Steam, Electricity or Oil Power.

In all cases it is desirable for the site to be inspected to form a proper appreciation of the work to be undertaken. We have on our staff an expert engineer from the Marion Steam Shovel Co., who is competent to advise buyers on the type of machinery best suited to their needs, and we can in all cases arrange to bring out men with special experience in this class of work for running the equipment and training local labour.



Marion Electric Dragline Excavator equipped with 150 feet boom and 5 cubic yard bucket Stripping Iron Ore.

PRIME MOVERS.

STEAM ENGINES AND BOILERS

GAS AND OIL ENGINES.

ON the following pages we group the various types of Engines, Boilers and Gas Producers of well-known high class makes for which we hold selling rights Our Agency Agreements enable us to offer buyers exceptional terms for the following well-known makes:—

STEAM ENGINES, Portables, Loco. and other type of Boilers, by Messrs. Ransomes, Sims and Jefferies, Ld., Ipswich.

Vertical Multitubular Boilers by Messrs. Cochran (Annan) Ld. Lancashire and Cornish Boilers by Messrs. Penman Ld., Glasgow.

Oil Engines for Kerosene, Crude and Tar Oils by Messrs. Tangyes Ld., Birmingham.

Vertical Cold Starting Oil Engines by Messrs. Ransomes, Sims and Jefferies, Ld., Ipswich.

Gas Engines and Suction Gas Plant by Messrs. Tangyes Ld., Birmingham.

Mechanical Water Coolers by Messrs. Heenan and Froude Ld., Worcester.

It is impossible to illustrate all types of Engines within the limits of a General Catalogue and the present list includes engines of moderate power only. We shall be pleased, however, to quote for Vertical High Speed Engines, Large Mill Engines, Steam Turbines, Power Units for generating electricity and submit detailed specifications, plans of lay-out, etc., on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

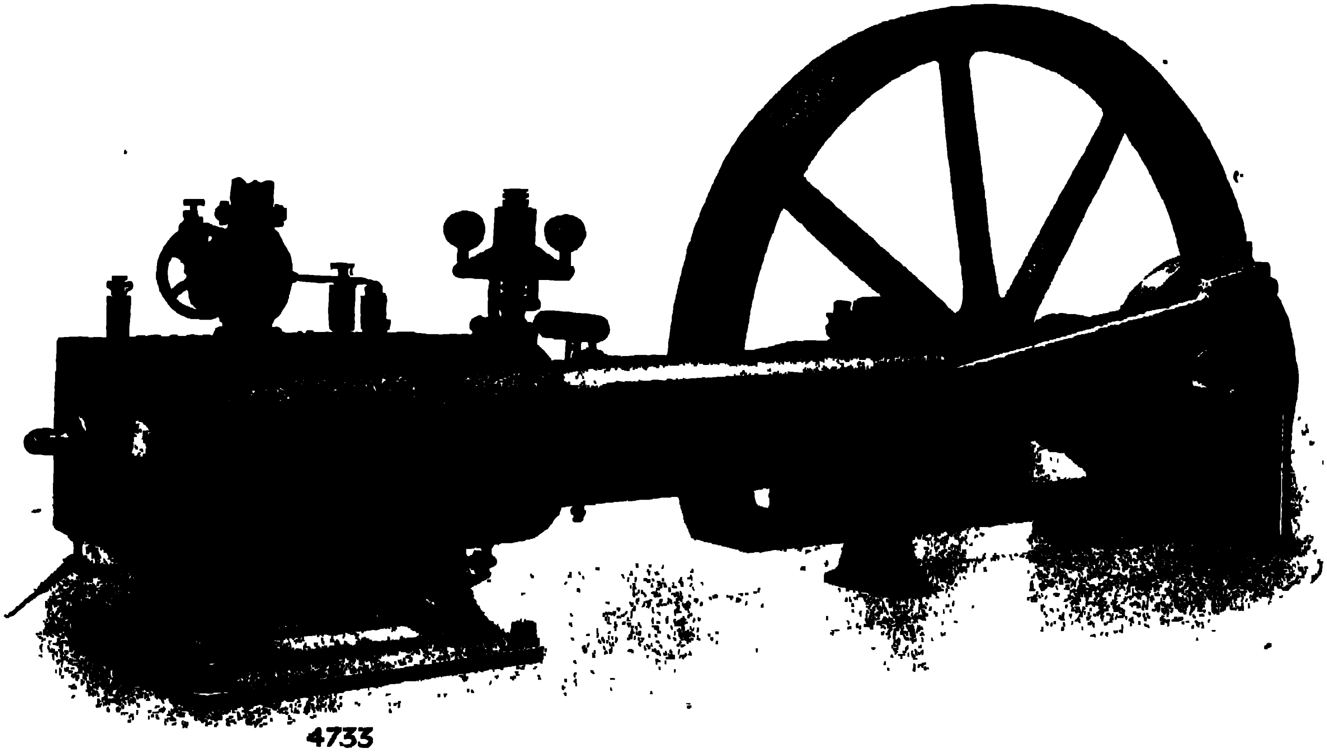
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes, Sims & Jefferies, Ld., Engines & Boilers.

Long-Stroke Stationary Engines.

Fitted with Automatic Governor Link Motion Expansion Gear.



4733

Specification.

The Cylinder is steam-jacketed, lagged, and cased with sheet-steel. It is supported on a cast-iron pedestal and at the end nearest the crankshaft it is provided with a cover which is easily removable without in any way disturbing the main frame.

The Main Frame is made in one casting of the circular hollow type, which, while lighter than the ordinary cast-iron foundation-plate, is considerably stronger, as it is in a direct line with the throw or thrust of the engine. The Guidebars are formed by the main frame casting which is bored out true; the guideblocks are circular.

The Connecting Rod is of steel and fitted with wide gun-metal brasses.

The Crankshaft is of steel. The crank is of the disc type, accurately turned, bored, and balanced, and securely fixed to the crankshaft.

The Flywheel is of large proportions and accurately balanced. Grooved flywheels for rope-driving can be supplied, if required, at an extra charge. Hand Barring Gear can be supplied as an extra.

Eccentrics and Slides.—The slide-valve eccentrics are so arranged that the engine can readily be set to run in either direction.

The Governor is of quick-speed type and very sensitive. It acts upon an equilibrium piston-valve and controls the movement of the engine with great accuracy. An Expansion Valve, by which the point of cut-off can be adjusted, is always fitted to these engines in addition to the main slide-valves.

Feed-Pump.—A feed-pump with brass valves and seatings, and worked by an eccentric from the crankshaft, can be supplied at an extra charge.

Right and Left-hand Engines.—The illustration shows a right-hand engine, which is always sent when not otherwise ordered.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** **RANGOON, MADRAS, BOMBAY, LONDON.**

Long-Stroke Stationary Engines.

Automatic Governor Link Motion Expansion Gear can be supplied at an extra charge and is strongly recommended in connection with these engines. By this arrangement the exact amount of steam required is admitted into the cylinder at full boiler pressure, in proportion to the load on the engine, thus effecting a further economy in fuel and ensuring great regularity of speed. When fitted with this gear these engines are much recommended for driving Electric Generators, or any other machinery where uniformity of speed is important.

Condenser.—These engines can be fitted, at an extra charge, with an Improved Jet Condenser and Air-pump, placed behind the cylinder and worked by an extension of the piston-rod through the back cover of the cylinder. A condenser-disconnecting valve, by means of which the engine can be worked either as a condensing or as a non-condensing engine, can be added at a small extra charge.

A Steam Trap for draining the jacket is included in the price.

Table of Dimensions.

Nominal H.P.	CYLINDER.		FLYWHEEL.			GROOVED FLYWHEELS.		INDICATED HORSE POWER.	
	Dia.	Stroke.	Diameter	Face	Revolutions per minute	Number of Ropes.	Size of Ropes.	Economical.	Maximum.
	ins.	ins.	ft. ins	ins.			ins		
10	10	20	7 0	8	110	4	1¼	35	45
12	11	20	7 0	8	110	4	1¼	40	55
14	12	24	8 2½	10	90	5	1¼	45	65
16	13	24	8 2½	10	90	6	1¼	55	75
20	14	28	9 0	12	80	5	1½	65	85
22	15	28	9 0	12	80	6	1½	75	95
25	16	32	10 0	14	70	7	1½	85	110
28	17	32	10 0	14	70	8	1½	95	125
32	18	36	12 0	16	60	6	1¾	105	140
36	19	36	12 0	16	60	7	1¾	115	155

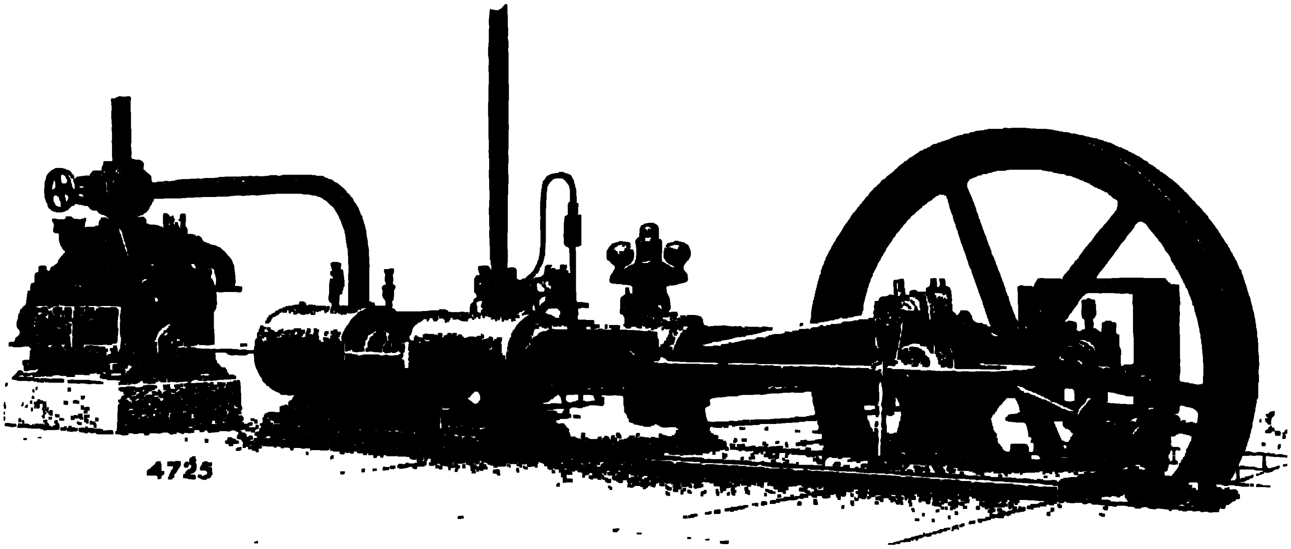
Boiler Pressure.—In calculating the powers given above, a boiler pressure of 80 lbs has been assumed. These Engines may also be worked at 100 lbs pressure.

Condensing Engines.—Engines fitted with condensers will develop economically one-fifth more power than is given in this table. In this case the engines should not be worked at more than 80 lbs. pressure.

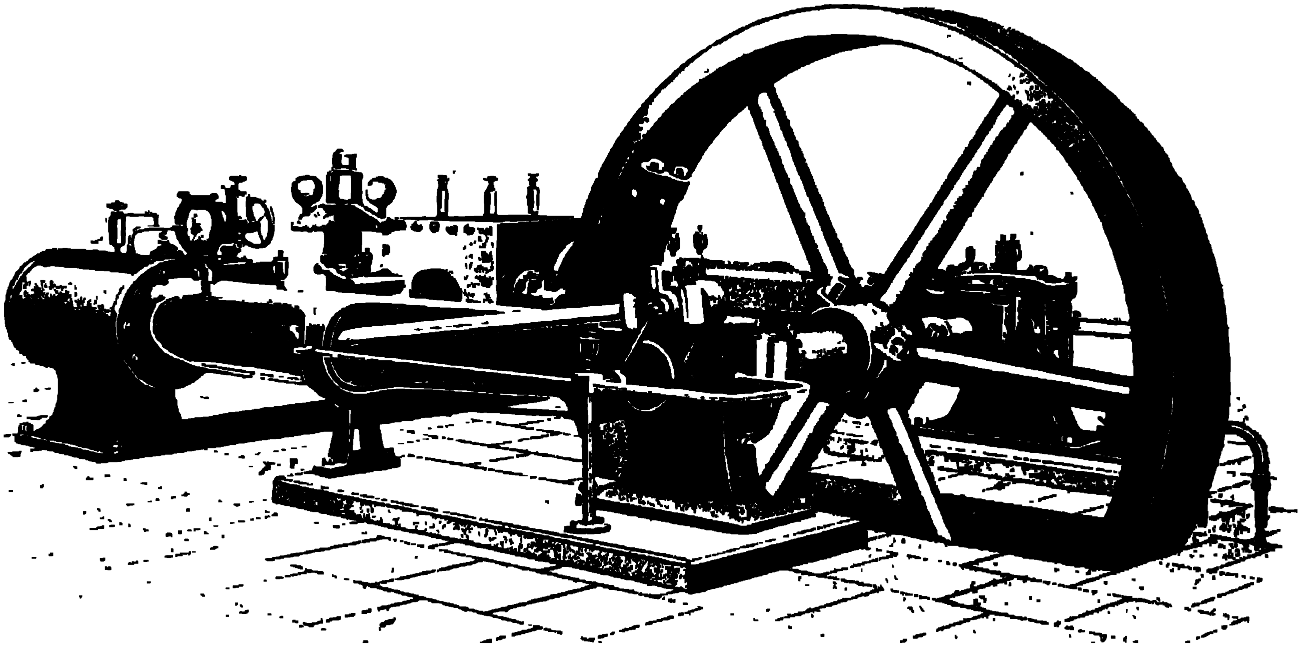
Prices.

Nominal H.P.	Engine and H.D. Bolts.	Automatic Expansion Gear, extra	Feed-Pump	Jet Condenser	Disconnecting Valve	Hand Barring Gear.	Grooved Flywheel, extra.
	Rs.	Rs.	Rs.	Rs	Rs.	Rs.	Rs.
10	5,125	360	252	1,765	135	232	250
12	5,755	376	270	1,765	174	232	250
14	6,430	465	310	1,898	213	290	405
16	7,305	505	350	1,898	232	290	445
20	8,200	635	430	2,126	243	335	520
22	9,230	695	465	2,126	280	335	620
25	10,355	785	505	2,593	355	335	755
28	11,770	860	540	2,593	355	335	870
32	13,395	990	575	2,710	410	410	870
36	14,625	1,100	635	2,710	465	410	1,005

Long-Stroke Stationary Engines.



Tandem Compound Long-Stroke Engines.
Fitted with Auto Expansion Gear, Jet Condenser and Disconnecting Valve.



Coupled Compound Long-Stroke Engines.
Fitted with Auto Expansion Gear and Jet Condensers.

The engines are generally as described in the preceding pages. A detailed specification will be sent on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tandem Compound Long-Stroke Engines.

No.	CYLINDERS. Diameter. High Pressure.	Low Pressure.	Stroke.	FLYWHEEL. Dia.	Face.	Revs. per	GROOVED FLYWHEEL. Ropes. No.	Dia.	INDICATED HORSE POWER. At 120 lbs pressure, non-condensing. Econ.	Maxm.	At 100 lbs. pressure, condensing. Econ.	Maxm.
	ins.	ins.	ins.	ft. ins	ins							
12	8	13½	20	7 0	8	115		1¼	42	48	42	52
16	9½	16	24	8 2½	10	90		1¼	56	66	56	70
22	10½	18	28	9 0	12	80		1½	76	88	76	94
28	12	20½	32	10 0	14	70		1½	100	116	100	124
36	13½	22½	36	12 0	16	65		1¾	130	150	130	160

Coupled Compound Long-Stroke Engines.

In these engines the high and low-pressure cylinders are placed side by side, the steam passage between them being led under the flooring. Each side of the engine consists of a cylinder, frame, and plummerblock, and is similar in general design to the high-pressure long-stroke engine. The crankshaft is of steel, and is fitted with a crank at each end, the cranks being set at right angles to each other. The flywheel is made in halves and placed between the frames. The two sides of the engine are connected by two strong steel tie bars which are secured to the cylinders by turned bolts fitted into reamered holes.

For facility in starting the engine a separate valve is provided by which high-pressure steam can be admitted to the low-pressure cylinder. This enables the engine to be started with the cranks in any position and with a full load.

No.	CYLINDERS. Diameter. High Pressure.	Low Pressure.	Stroke.	FLYWHEEL. Dia.	Face.	Revs per min.	GROOVED FLYWHEEL. Ropes. No.	Dia.	INDICATED HORSE POWER. At 120 lbs. pressure, non-condensing. Econ.	Maxm.	At 100 lbs. pressure, condensing. Econ.	Maxm.
	ins.	ins.	ins.	ft. ins	ins.			ins.				
25	10	16	20	7 0	12	110	5	1½	65	80	65	90
35	12	20	24	8 2½	16	90	7	1½	95	115	95	125
50	14	23	28	9 0	20	80	7	1¾	140	165	140	180

Prices.

	Size.	Engine & H.D. Bolts.	Feed Pump.	Jet Condenser.	Disconnecting Valve	Hand Barring Gear.	Grooved Flywheel.
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
TANDEM TYPE.	12	6,240	525	2,400	175	235	255
	16	8,925	740	2,750	235	290	410
	22	11,495	750	3,070	280	340	505
	28	16,320	845	3,670	340	340	770
	36	21,800	935	4,290	415	415	940
COUPLED COMPOUND	25	12,725	525	2,735	295	235	370
	35	16,330	705	3,510	410	290	625
	50	21,650	875	4,130	525	340	800

Detailed specification on application.

Girder-Frame Steam Engines.

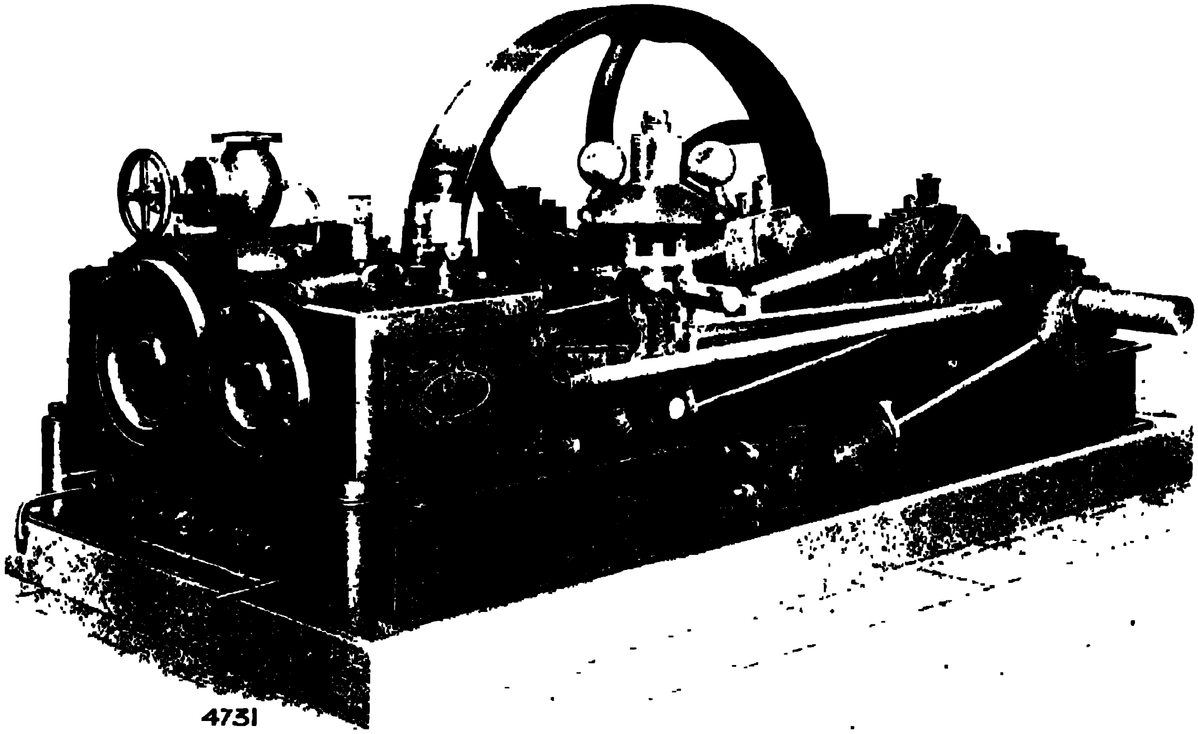


Illustration of Compound Type Engine.

Girder-Frame Steam Engines are specially recommended for cases where the reduction of weight for transport is an important consideration. The whole engine can be easily dismantled and packed light, while with a steel frame there is no risk of breakage in transit.

The Compound Engine is a very popular type on account of its economical steam consumption and compactness It is an ideal engine for mills and factories of moderate size and requires the minimum of space.

A Feed Pump, as shown in the illustration above, is supplied, when required, at an extra charge.

An extra length of crankshaft and outer bearing are included in the price of the Simple Engines for powers of 7 Nom. H. P. and upwards, and of all Compound Engines.

Electric Lighting.—When either a Simple or Compound type of Engine is required for driving Electric Generators, or for any other purpose where it is important to maintain a constant speed under varying loads, it is recommended that the Engines should be fitted with Automatic Governor Expansion Gear and Flat-type Rider Valves. **This fitting is included in the price of the Compound Engines,** but if the purchaser prefers a Pickering Governor and Single Slide Valve to high-pressure cylinder these can be supplied, and a reduction is made in the price. For Electric Light purposes heavier Flywheels can be supplied at an extra charge. Grooved Flywheels for rope driving can also be offered.

Reversing Gear can be supplied to either type of Engine when fitted with single slide to high-pressure cylinder and Pickering Governor. Not otherwise.

A Condenser can be supplied for Engines of either type, also disconnecting valves which enable the Engines to be worked either with or without the Condenser. When using the Condenser an additional 20 per cent. of power is obtained, also greater economy.

A Separate Surface Feed-water Heater is often supplied with these Engines. This apparatus not only heats the water to a high temperature and thereby economises fuel, but it also serves to purify the water, and **is strongly recommended where the water is impregnated with lime or other foreign matter.** These Heaters are made with brass tubes and may be either of the vertical or horizontal type.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Girder-Frame Steam Engines.

Powers and Particulars.

Simple Girder-Frame Engines.—These Engines are suitable for 100 lbs. working pressure at which they will give off an effective or brake horse power equal to three times their Nominal Horse power continuously, with extra power to meet emergency demands.

Single-Cylinder.

Nominal H.P.	CYLINDER. Diameter.	CYLINDER. Stroke.	FLYWHEEL. Diameter × Width.	FLYWHEEL. Revolutions per minute.	Prices Engine & H.D. Bolts.	Prices Feed Pump.
	ins	ins.	ft. ins. ins.		Rs.	Rs.
5	7¾	12	4 6 × 6	155	2,540	100
6	8½	12	4 6 × 6	155	2,840	100
7	9¼	12	4 9 × 8	150	3,260	140
8	10	12	4 9 × 8	150	3,620	140
10	11	14	5 0 × 9	140	4,140	160
12	12	16	5 6 × 10	130	4,680	220

Double-Cylinder. Prices on application.

Compound Girder-Frame Engines.

These Engines are designed to work at 150 lbs. pressure, at which they will give off economically and continuously an effective or brake horse power equal to three times, or, as a maximum, three and a half times their nominal horse power.

The following are the leading particulars :-

Nominal H.P.	CYLINDERS. Diameter high-pressure	CYLINDERS. Diameter low-pressure	CYLINDERS. Stroke of both cylinders.	FLYWHEEL. Diameter.	FLYWHEEL. Face.	FLYWHEEL. Revolutions per minute.	GROOVED FLYWHEEL. Number of Ropes	GROOVED FLYWHEEL. Size of Ropes.
	ins.		ins	ft ins	ins			ins.
8	5¾	9	12	5 0	7	180	3	1
10	6½	10	12	5 0	8	180	4	1
12	7	11	14	5 6	8	155	4	1¼
16	8	12¾	16	5 6	10	135	5	1¼
20	9	14	16	6 0½	10	135	6	1¼
25	10	16	18	7 0	12	120	5	1½
30	11	17½	18	7 0	14	120	6	1½
40	13	20½	24	8 0	18	90	6	1¾
50	14		24	8 0		90	7	1¾

Prices of Compound Engines.

Nominal H.P.	Engine & H.D. Bolts. Type A.	Engine & H.D. Bolts. Type B.	Feed Pump.	Jet Condenser.	Disconnecting Valve.	Grooved Flywheel.	Loco. Type Boiler with Colonial Fire-box.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
8	6,015	5,475	140	1,240	100	200	4,160
10	6,675	6,135	160	1,240	140	140	4,700
12	7,135	6,515	220	1,565	140	160	5,380
16	8,440	7,760	280	1,590	160	220	6,800
20	9,325	8,515	280	1,950	190	280	8,320
25	9,945	8,940	405	2,380	220	325	9,800
30	13,220	12,000	405	2,550	280	405	11,720
40	19,170	17,645	540	2,840	390	540	14,420
50	23,070	21,235	675	3,285	445	675	17,540

Type A Engines are fitted with Automatic Governor, Expansion Gear, Mechanical Oil Feed Lubricator to H. P. Cylinder and Steam Trap. **Type B** have Pickering Governors and single slide valves.

All compound Engines have an extension shaft and outboard bearing.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

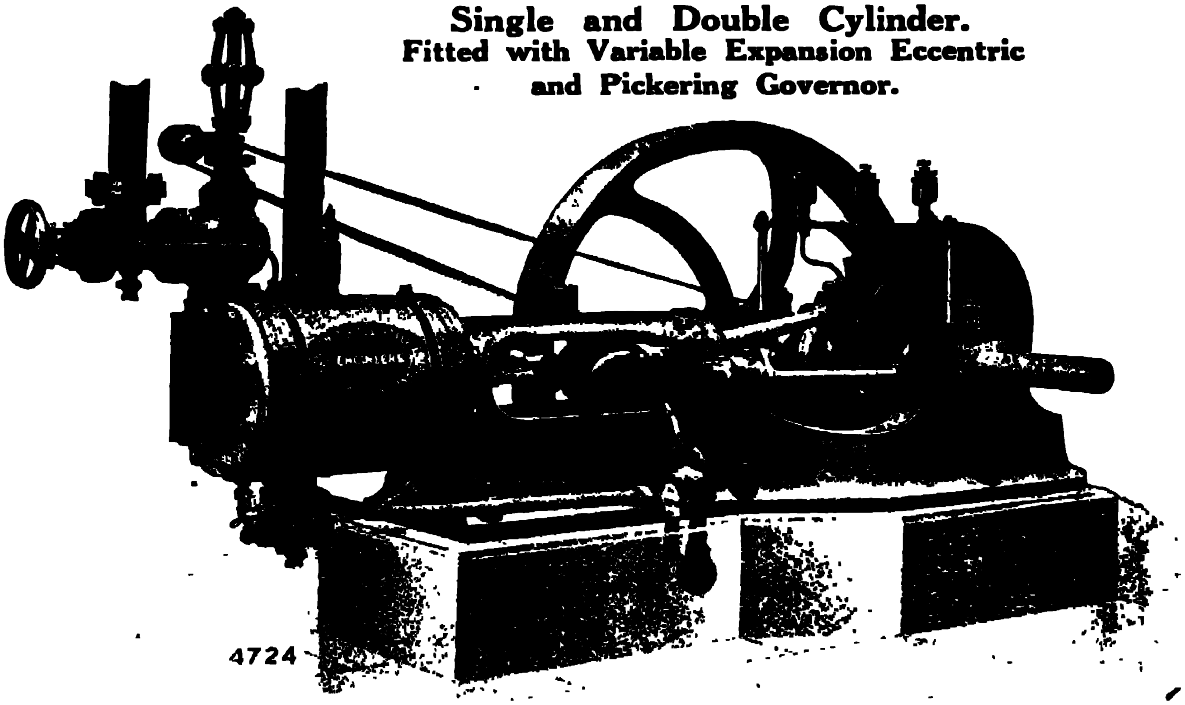
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

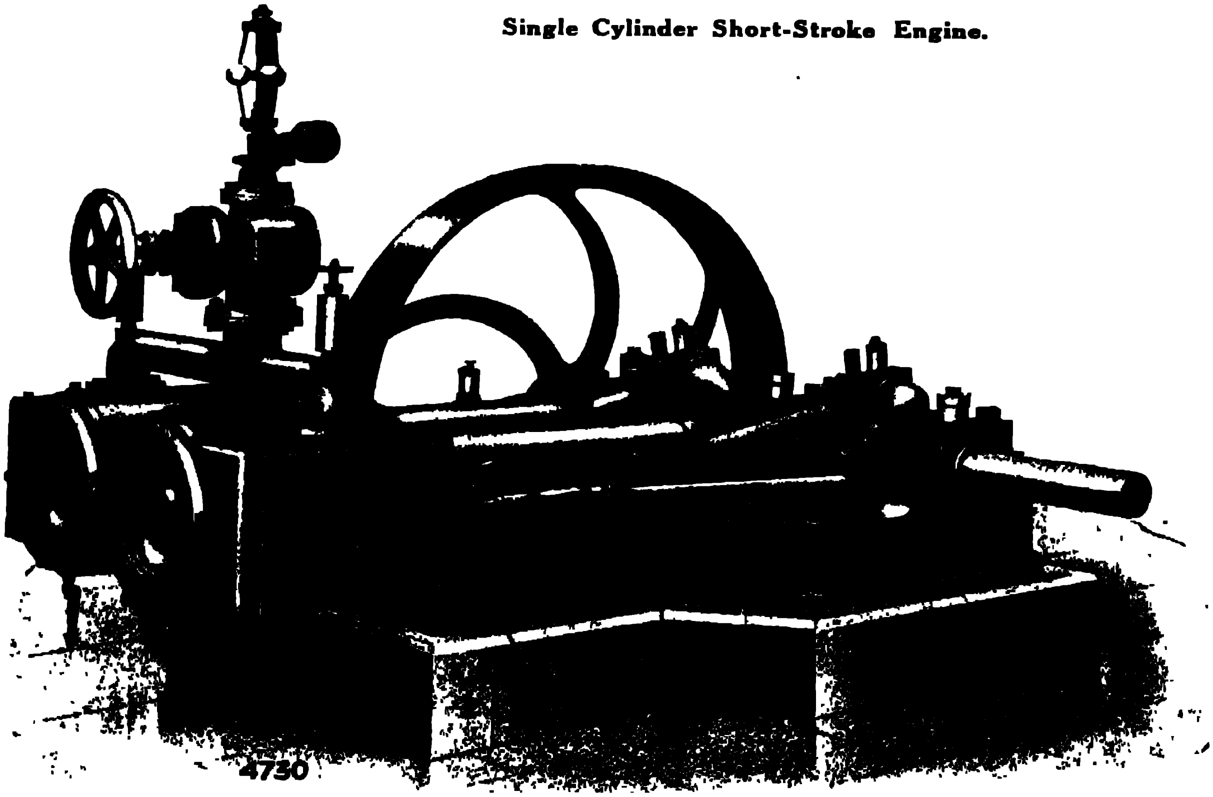
Short-Stroke Stationary Engines.

Single and Double Cylinder.

Fitted with Variable Expansion Eccentric and Pickering Governor.



Single Cylinder Short-Stroke Engine.



Double Cylinder Short-Stroke Engine.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Short-Stroke Stationary Engines.

In these Engines the bedplate, crosshead guides, and plummerblocks for the crankshaft are all cast in one piece, and the cylinder with the valve-chest is bolted to the end of the frame. The bedplate is planed on the underneath side for facility of fixing, and the general design is very strong, neat and compact.

The Cylinder—which in the large engines is steam jacketed—is made with a separate liner. The guides are accurately bored and the end turned to receive the cylinder.

The Crankshaft is of sufficient length to give off the power from either end. The plummerblocks are fitted with massive gun-metal bearings, which are capable of easy adjustment.

The Flywheel is of full width for transmitting the maximum power of the Engine.

The Governor is of the high-speed Pickering type and very sensitive in its action.

A Variable-Expansion Eccentric is fitted to the Engine; this enables the motion of the Engine to be reversed, and the cut-off varied from the maximum down to a quarter of the stroke, thus reducing the consumption of fuel in proportion to the power given off.

These Engines are also made with double cylinders to meet the demand for a simple, strong, quick-running engine of 25 N.H.P. and upwards.

The Slide-Valves are each worked by an Improved Variable-Expansion Eccentric by which arrangement the Engine can be set to run in either direction, and the cut-off can be varied from the maximum down to a quarter of the stroke, so that the consumption of fuel may be kept in proportion to the power required from and actually given off by the Engine.

The Plummerblocks are fitted with massive gun metal bearings which can be readily adjusted. A third plummerblock with adjustable gun-metal bearings is fixed between the two cranks.

The Engine is fitted with a "Pickering" Governor acting on a double equilibrium throttle-valve and controlling the motion of the Engine with great accuracy.

Single Cylinder Engines.

Nominal Horse Power.	Diameter of Cylinder.	Length of Stroke.	Revolutions per minute.	FLYWHEEL.		Prices.	
				Diameter.	Face.	Engine.	Feed Pump.
	ins.	ins.		ft ins.	ins.	Rs.	Rs.
4	6¼	10	180	4 0	6	1,630	105
5	7	10	180	4 3	6	1,935	105
6	7¾	10	180	4 6	6	2,150	105
7	8¼	12	160	4 6	6	2,490	155
8	9¼	12	160	4 9	8	3,020	155
10	10	12	160	5 0	9	3,380	175
12	11	14	150	5 0	9	....	....

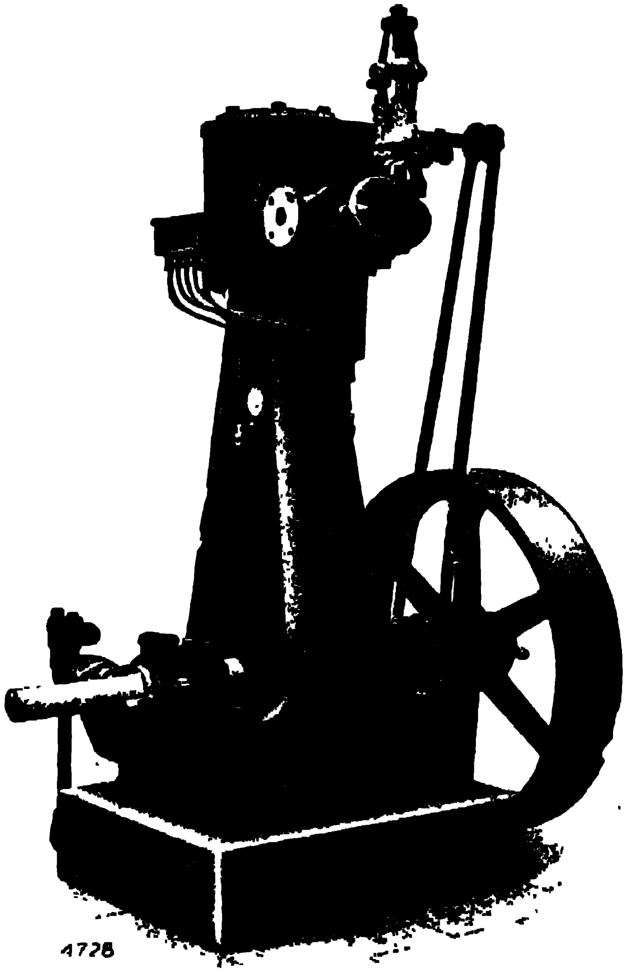
Double Cylinder Engines.

Nominal Horse Power.	CYLINDER.		FLYWHEEL.			Grooved Flywheel.	Maximum Continuous Load recommended at 80 lbs. pressure.	Prices.	
	Diameter.	Stroke.	Diameter.	Face.	Revolutions per minute.	No. and Size of Grooves.		Engine.	Feed Pump.
	ins.	ins.	ft. ins.	ins.		ins.	Brake Horse Power.	Rs.	Rs.
25	12¼	16	6 0½	10	140	8 × 1¼	75	5460 ~~3,010~~	420
30	13¼	18	6 0½	11	140	9 × 1¼	90	....	....
35	14¼	18	6 0½	12	130	10 × 1¼	105	.. .	....

Extra length of Crankshaft and Outer Bearing and Foundation Bolts can be supplied at an extra charge.

New Vertical Steam Engines.

Type R.V.



These are of substantial construction designed for working at pressures up to 100 lbs., and for driving dynamos and other machinery continuously while governing efficiently, at the moderately high speeds given in the table. The makers have aimed at producing a thoroughly reliable engine at a low price and they have requisitioned the lessons of their long experience in engine design with this end in view.

The Double Standard, bored to form the Crosshead Guide, is cast in one with the Crank Bearings, which have oil chambers and covered sight holes for observation of oiling rings.

The Cylinder and Valve Chest are lagged with blued steel: they have machined, polished covers, also independent stuffing boxes and glands, the latter being brass or brass-bushed. Substantial gun-metal drain cocks are fitted.

A Guide Bracket, of massive construction, supports the valve spindle outside the chest.

The Crankshaft, of ample strength, is of forged steel, and long enough to take a pulley at the opposite end to the flywheel.

The Bearings of the crankshaft and connecting rod are of gun-metal and readily adjustable.

The Governor is of the well-known Pickering Type; the speed can be adjusted while running.

The Flywheel is of ample weight and turned on face to receive a driving belt.

New Vertical Steam Engines.

Lubrication is effected by a Sight Feed Lubricator on the steam inlet; a large Central Oil Box with unions and brass pipes supplies the crosshead guide, both ends of the connecting rod and the eccentric: the crank bearings have ring lubricators saving much oil. No extra charge is made for this arrangement, which provides for the engine being run continuously.

The **Feed Pump,** which can be supplied as an extra, has a brass plunger: the gun-metal valves and valve seats are easily accessible.

The **Feed Water Heater,** also an extra, is of the surface type, with removable cleaning doors and brass tubes around which the exhaust steam passes.

These Engines can be combined either with a Vertical Cross-Tube Boiler or with a Locomotive Multitubular Boiler.

The smallest sizes of Vertical Boilers recommended are given in the table below. In India where the average heat value of coal is low, a size larger boiler is recommended if economical working and continuous full power are desired.

Dimensions and Weights.

Cylinder: Diam. × Stroke	4½" × 8"		5½" × 8"		6½" × 10"		7½" × 10"		8" × 12"		9" × 12"	
Revolutions per Minute	260	190	260	190	210	170	210	170	175	140	175	140
B.H.P. — Pressure at Stop Valve. 60 lbs.	4¾	3½	7¼	5¼	10	8½	14	11	15½	12½	20	16
B.H.P. — Pressure at Stop Valve. 80 „	6	4¼	9¼	6¾	13	10½	17½	14	20	15½	25	20
B.H.P. — Pressure at Stop Valve. 100 „		5¼	10½		15	12	20	16	23	18	29	23
Flywheel: Diam. × Width..	3' 0" × 5"		3' 0" × 5"		3' 6" × 6"		3' 6" × 6"		4' 6" × 7"		4' 6" × 7"	
Crankshaft: Diam. ..	2½"		2½"		3"		3"		3½"		3½"	
Steam Inlet: Diam. ..	1½"		1½"		1¾"		1¾"		2"		2"	
Exhaust Outlet: Diam. ..	1¾"		1¾"				"		2½"		2½"	
Length: Over Crankshaft..	3' 11"		3' 11"		4' 7"		4' 7"		4' 10"		4' 10"	
Depth: Front to Back ..	3' 3"		3' 3"		3' 7"		3' 7"		4' 6"		4' 6"	
Height: from Bedplate ..	5' 9"		5' 9"		6' 7"		6' 7"		7' 6"		7' 6"	
Net Weight: .. Cwts.			10		13		14		19		21	
Gross Weight: .. „			12		16		17		23		25	
Price with H.D. Bolts Rs.	1,125		1,285		1,690		1,890		2,200		2,440	
Feed Pump: Extra Rs.	100		100		110		110		150		150	
Size of Vertical Boiler: ..	J.M.	J.L.	J.N.	J.M.	J.O.	J.N.	R.P.	J.O.	J.Q.	R.P.	J.R.	J.Q.
Diameter:	2' 9"	2' 6"	3' 3"	2' 9"	3' 9"	3' 3"	3' 9"	3' 9"	4' 3"	3' 9"	4' 6"	4' 3"
Height:	6' 9"	6' 0"	7' 9"	6' 9"	8' 6"	7' 9"	10' 0"	8' 6"	9' 5"	10' 0"	10' 5"	9' 5"
N.H.P. of Loco-Type Boiler Recommended ..	2	2	3	2½	5	4	6	5	7	6	8	7

Slower Speed Engines.—When preferred we can quote for slow speed Vertical Steam Engines which are sometimes more suitable for driving certain classes of machinery.

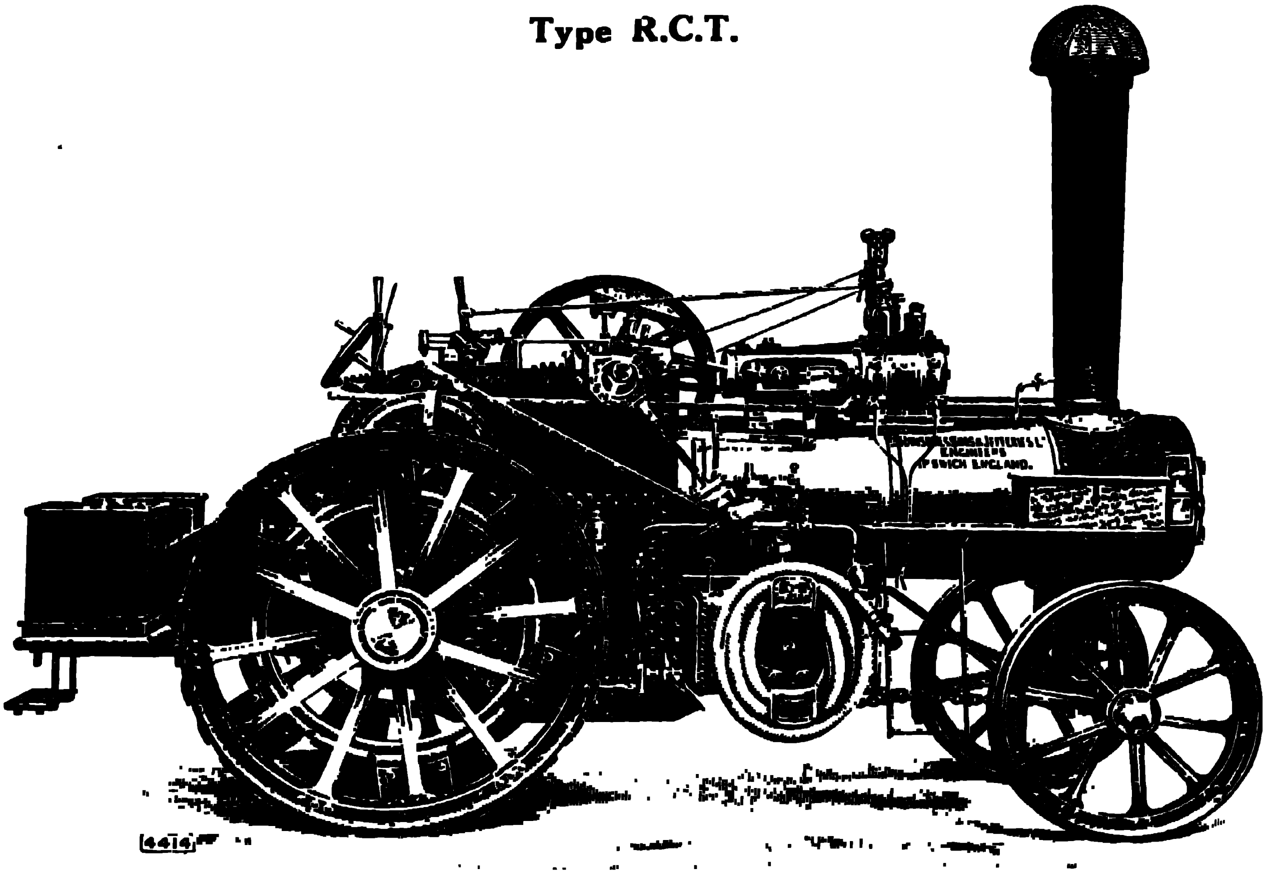
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Special Light Agricultural Traction Engines.

Type R.C.T.



These Special Light Traction Engines have been designed to supply the place of Portable Steam Engines for driving appliances such as Stone Breakers, Thrashing Machines or other similar machines, which it is required at intervals to move from place to place.

Several of these Engines were used on the Western Front during the late war and were very popular with the drivers. In the soft condition of the ground generally prevailing they were able to haul their loads across country which heavier engines could not deal with.

The 35 B. H.-P. Engine of this type is very suitable for direct Traction Ploughing.

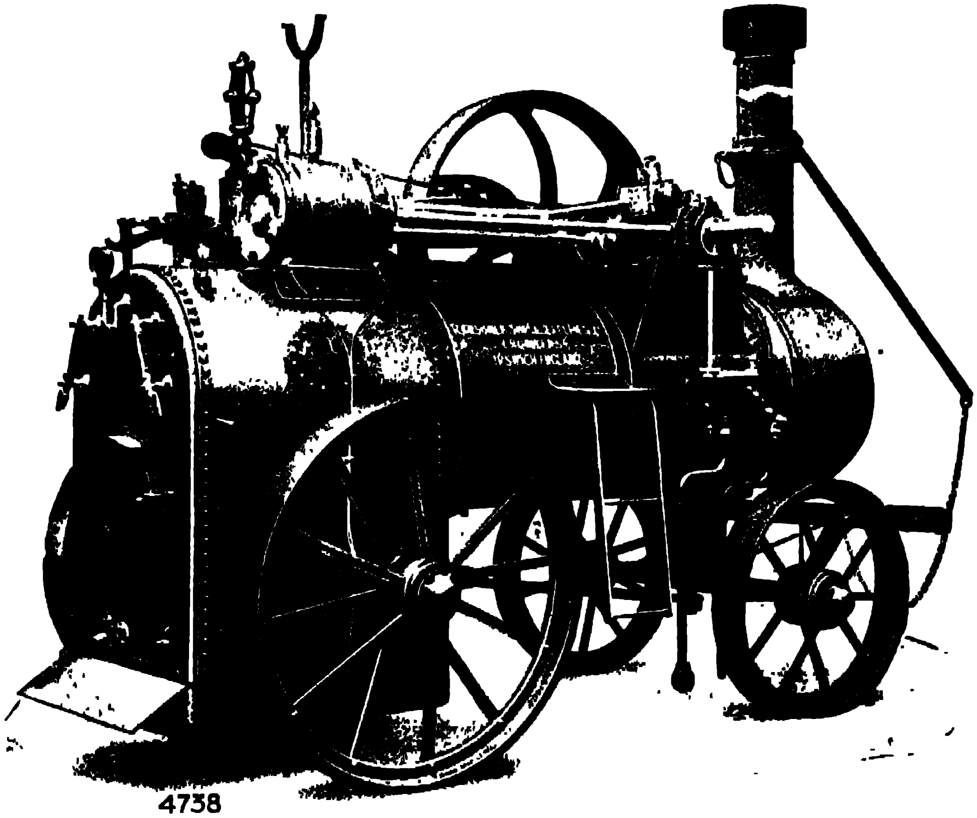
Particulars and Prices.

	15 B.H.-P	18 B.H.-P.	25 B.H.-P.	30 B.H.-P	35 B.H.-P.
Weight empty tons		5¾	6¾	7¾	9½
Weight with coal and water „		6⅝	7¼	8¾	10¼
Diameter of cylinder ..	6 in.	6½ in.	7 in.	7½ in.	8 in.
Stroke of piston ..	8 in.	8 in.	9 in.	9 in.	9 in.
Number of revolutions ..	240	240	240	240	240
Flywheel diameter and width	3ft. 0in × 6 in	3ft. 0in. × 7in.	3ft. 0in. × 8in.	3ft. 0in. × 9in.	3ft. 0in. × 9in.
Speed miles per hour	2	2	2	2	2
Diameter of driving wheels	5 ft. 0 in.	5 ft. 0 in.	5 ft. 3 in.	5 ft. 3 in.	6 ft. 0 in.
Width of driving wheels ..	12 in.	14 in.	16 in.	18 in.	18 in.
Equal to, as regards driving a Thrashing Machine, a Portable Engine of ..	5 N.H.-P.	6 N.H.-P.	8 N.H.-P.	10 N.H.-P.	12 N.H.-P.
Approximate gross load hauled in fast gear on good macadamized roads with ordinary gradients	8 tons	9 tons	10 tons	11 tons	15-20 tons
Price. **Rs.**	**10,880**	**12,160**	**14,320**	**15,740**	

Detailed specification on application.

Portable Steam Engines.

With One Cylinder.



4738

The above illustration represents Ransomes, Sims and Jefferies' Single-Cylinder Portable Steam Engines, from 3 to 12 Nominal Horse-Power with extra-large fire-box for burning wood or any kind of inferior fuel. The standard fitting is with fire-box for coal.

The Cylinder, in Engines of 3 Nom. H.-P. and upwards, is thoroughly steam-jacketed; it is further protected from cold, and subsequent condensation of steam and loss of heat, by wood and sheet-iron lagging. The outer shell of the cylinder and the valve chest are made in one casting, the inner or working barrel being cast separately of special hard-iron.

The Crankshaft has the crank or dip on one side, close up to the bearing, the thrust being thus well supported. The shaft is of sufficient length to take a flywheel or pulley at either or both ends.

The Brackets, in Engines of 3 Nom. H.-P and upwards, which support the crankshaft bearings, are of wrought-iron, and are riveted to the boiler. The brasses are provided with a vertical and lateral adjustment, so that the crankshaft can always be kept perfectly true.

N.B.—A Ladder, as shown in the illustration, is supplied with Engines of 6 Nom. H.-P. and upwards.

Deliveries from Stock.

Portable Steam Engines.

Ransomes, Sims and Jefferies were, so long ago as 1842, the recipients of the First Prize for Portable Engines at the Bristol Show of the Royal Agricultural Society of England.

The Crankshaft Plummerblocks, in Engines of 3 Nom. H.-P. and upwards, are connected to the cylinders by strong wrought-iron stay-rods, which relieve the boiler of all strain and form a rigid connection in the direct line of thrust, suitable arrangements being made for expansion.

Connecting Rod, in Engines of 3 Nom. H.-P. and upwards is provided with an improved strap and cotter adjustment at each end, the strap being bolted firmly to the connecting-rod head and the brasses adjusted by a cotter which is fixed by a set screw.

Reversing and Variable-Expansion Eccentric. On every Engine the slide-valve eccentric sheave is so arranged that the Engine can be made to run in either direction, and the sheave can be adjusted to vary the cut-off from the maximum down to a quarter of the stroke, thus reducing the consumption of fuel in proportion to the power given off by the Engine.

The Governor is of the "high-speed" Pickering type, with light balls, the range of which is regulated by a spring. It is in direct communication with an **Equilibrium Throttle-Valve.**

The Boiler is of large dimensions and contains ample heating surface to generate sufficient steam, without excessive stoking, to enable the Engine to give off its maximum power. The boilers are of very ample strength throughout for working at a steam pressure of 120 lbs. per square inch; they are made of the very best mild steel plates, flanged and riveted by hydraulic machinery, and are provided with a complete set of fittings, including a manhole and the necessary mudholes, etc. (see "complete Equipment" on opposite page) and are lagged with wood and neatly cased with sheet-iron.

The Fire-box has a raised top to provide increased steam space. The inside fire box is made of mild steel of special quality, and has a specially large grate area, to burn not only coal, but also any kind of ordinary firewood. For burning large logs, peat, sawdust and other inferior fuel, the fire-boxes are made of extra large or "Colonial" dimensions, at a slightly increased cost. Special Straw-burning Portable Engines can also be supplied Every fire-box is provided with a fusible plug, as a protection against injury in the event of the water having been allowed to fall too low in the boiler.

Economy of Fuel and Steam. The heating and grate surfaces are so proportioned as to give the greatest possible economy of fuel and steam in proportion to the load on the Engine.

The Feed-Pump is continuous-acting. The valves and seatings are of brass, and the covers of the valve chambers are so arranged that they can be easily taken off for examination and replaced while the boiler is under full steam pressure. A shut-off valve is also provided so that, if necessary, the suction or delivery valves can be examined or taken out whilst the boiler is under steam.

A Simple Heating Apparatus is provided, by which the feed-water is heated and introduced into the boiler at a high temperature.

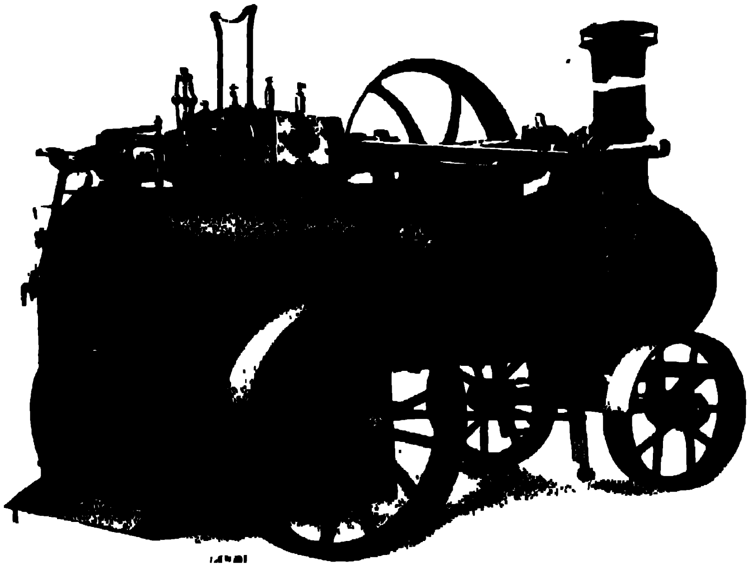
A Steam Blast is fitted into the chimney, by which the draught can be increased and steam raised very quickly.

The Road Wheels and Axles are of wrought-iron and the fore-carriage is furnished with a spherical locking gear, which allows the wheels to adapt themselves to the inequalities of the ground. Shafts or poles for horses or oxen are supplied as preferred.

Portable Steam Engines.

By Messrs. Ransomes, Sims and Jefferies, Ltd.

(Ipswich, England.)



Single Cylinder, Double Cylinder and Compound Types, with or without Special Fireboxes for burning Inferior Fuels. Tested to four times the rated horse-power.

JESSOP & CO., LTD.
Sole Agents.

[To face page 464]

Portable Steam Engines.

Brakes for use in hilly countries may be fitted to the hind wheels when required, at an extra charge.

Testing. The boilers are tested by hydraulic pressure to 220 lbs. per square inch and are designed for a working pressure of 120 lbs., at which pressure the Engines are capable of giving off continuously an effective or brake horse-power equal to **four times their nominal power,** and, for short periods, even more, but the **continuous economical load** at which the makers recommend them to be used is **three and a half times their nominal horse-power.**

Complete Equipment. Steam pressure gauge with syphon and cock, glass water-gauge, two gauge cocks, whistle, safety valve with spring balance, lock-up safety valve, blow-off cock, steam-jet to chimney, fusible plug in crown of fire-box, pipe for heating the feed-water, set of firebars, tube brush and rod, firing tools, shovel, wire spark-catcher, set of spanners, oil-can, water funnel, spare gauge-glass, tool-box with lock and key, skid and chain, and waterproof cover.

A Chimney Lifter is fitted to every engine.

Ring Spark Arresters can be supplied at an extra charge.

Hand Pumps and Injectors can be supplied at an extra charge.

Durability and Facility of Repairs. Duplicate parts can be had at any time by giving the number of the engine, which will be found on the nameplate attached to the engine.

Instructions for Working. A book of instructions is sent out with each engine.

Reversing Gear can be supplied at an extra charge.

Automatic Governor Expansion Gear. When great regularity of speed is required in engines of 4 Nom. H.-P. and upwards Messrs. Ransomes, Sims and Jefferies recommend their **Automatic Governor Expansion Gear** with flat type Rider Valves.

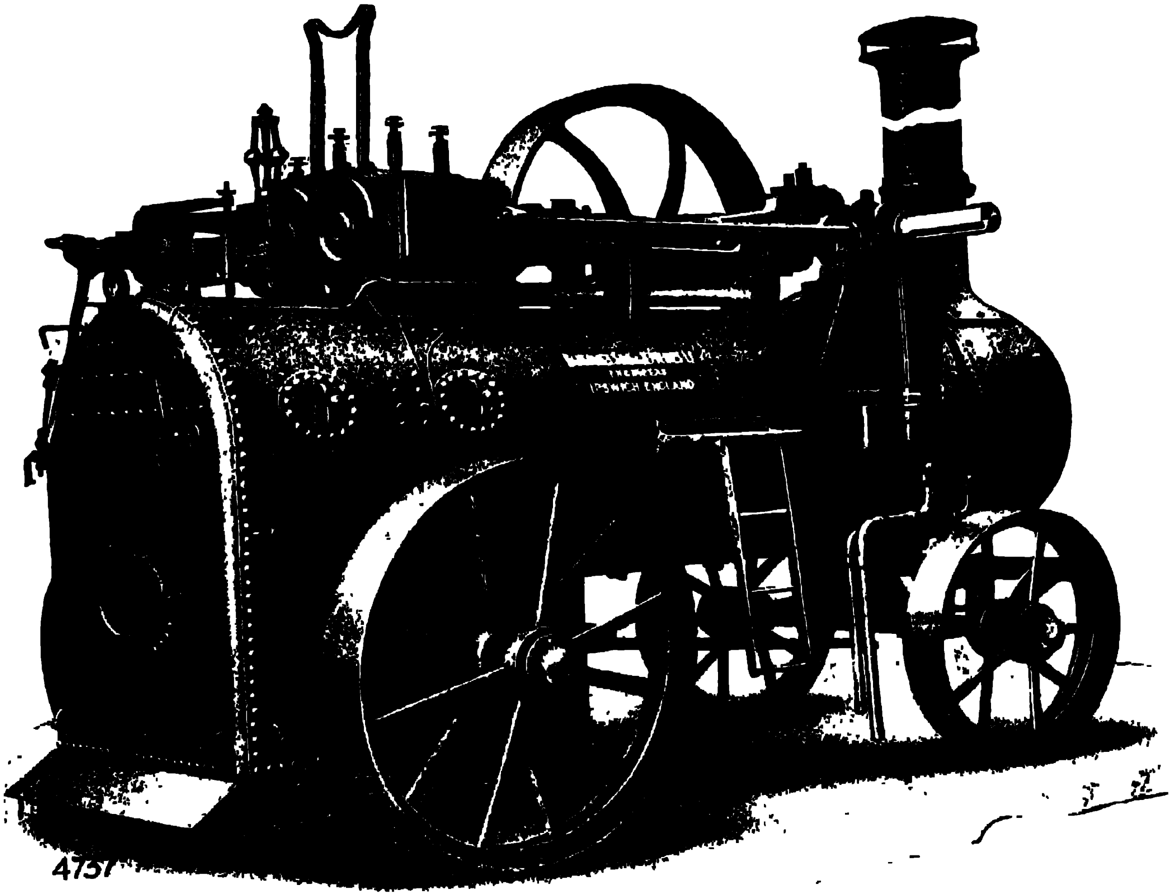
Nominal H.-P.	CYLINDER.	FLYWHEEL				**Prices.**	
	Diameter Stroke.	Dia.	×	Face.	Revolutions per minute.	With Standard Fire-box.	With Colonial Fire-box.
Single Cylinder.	ins. ins.	ft. ins.		ins.		**Rs.**	**Rs.**
2	5 × 8	3 6	×	4	220	**3,600**	**3,660**
2½	5⅝ × 8	3 9	×	5	185	**4,045**	**4,120**
3	6½ × 10	4 0	×	6	175	**4,505**	**4,600**
4	7 × 10	4 3	×	6	165	**5,130**	**5,250**
5	7¾ × 12	4 6	×	6	155	**5,600**	**5,750**
6	8½ × 12	4 6	×	6	155	**6,090**	**6,270**
7	9¼ × 12	4 9	×	8	150	**6,535**	**6,745**
8	10 × 12	4 9	×	8	150	**7,000**	**7,250**
10	11 × 14	5 0	×	9	140	**8,060**	**8,350**
12	12 × 16	5 6	×	10	130	**9,300**	**9,575**

Injectors can also be fitted (if ordered with engine) at an extra charge of **Rs. 175-0** each.

NOTE.—When comparing Ransomes' Portable Steam Engines with those of other makes the cylinder dimensions should be specially noted. Engines with smaller cylinders are often classed as the same nominal horse-power rating as Ransomes' engines, but the actual horse-power they are capable of developing may be considerably less.

Portable Steam Engines.

With Two Cylinders.



The above illustration represents Ransomes, Sims and Jefferies' Double-Cylinder Portable Engines, from 10 to 30 Nominal Horse-Power with large or "Colonial" fire-box for burning wood or any kind of inferior fuel. The standard fitting is with fire-box for coal.

Table of Dimensions.

Nominal H.-P.	CYLINDER.		FLYWHEEL.				
	Diameter.	Stroke.	Diameter.		Face.	Revolutions per minute.	**Prices.**
Double-Cylinder.	ins.	ins.	ft.	ins.	ins.		**Rs.**
10	7¾	12	5	0	9	140	**8,950**
12	8½	12	5	6	10	130	**10,315**
14	9¼	14	5	6	10	130	**11,400**
16	10	14	5	6	10	130	**12,700**
20	11	14	6	0½	11	115	**14,590**
25	12	16	6	1½	14	115	**17,440**
30	13	16	6	1½	15	115	**21,400**

For general description of these Engines see preceding pages.

See Footnote on previous page with reference to power ratings.

Compound Portable Steam Engines.

The continuous demand for Engines which are capable of economising fuel to the greates possible extent has led to the ever increasing use of Compound Engines, which, working a a high pressure, generate steam most economically, make use of its fullest expansive force and thereby secure the largest amount of power for the fuel consumed.

Compound Engines are now too well known to require any lengthy description, but it ma be briefly pointed out that they are provided with two cylinders, *viz.*, a high-pressure and a low pressure cylinder. The steam—which is maintained in the boiler at a pressure of 150 lbs.—is first admitted into the smaller, or high-pressure cylinder, and after having done its work there, instead of being allowed to escape into the atmosphere, it is led into the larger, or low-pressure cylinder, where, by further expansion, it effects considerable additional work. From the low-pressure cylinder the steam is allowed to escape through the exhaust port at but little above atmospheric pressure.

The Cylinders are placed side by side, and are of the most suitable proportions to ensure steadiness in work; they are steam-jacketed, lagged on the outside, and covered with sheet-steel. The outer shell of the cylinders and the valve-chests are made in one casting, the inner, or working barrels, being cast separately of a special hard iron.

The Slide-Valves are also of special hard metal and are accurately faced and easily accessible; outside covers are fitted to the valve-chests and can readily be removed for inspection of the valves.

Electric Lighting. For driving dynamos or any other machinery where uniformity of speed is important, these engines are always recommended to be fitted with **Automatic Governor Expansion Gear.**

The Crankshafts are made of the best hammered scrap-iron or steel, and are of sufficient length to give off the power on either or both sides at once.

Auxiliary Starting Valves. These engines can be started with the cranks in almost any position, and with a full load. To facilitate this, in addition to the main regulator-valve, a separate valve is supplied, by which high-pressure steam can be admitted to the low-pressure cylinder.

Reversing. The eccentric sheaves of the slide-valves are so arranged that by slackening two nuts and moving the eccentric sheaves, a very simple alteration, the Engine can in a few minutes be set to run in either direction.

The Boilers are of the locomotive multitubular type, of large capacity and extra strength. The plates are of the best quality mild steel and are flanged by hydraulic machinery; the edges of the plates are planed, the smoke-box tube-plates are turned on the outer face of the flange, and the riveting is done entirely by hydraulic machinery. The boilers are strongly stayed throughout; they are proved by hydraulic pressure to 250 lbs. per square inch, and are capable of working at continuous pressure of 150 lbs.

The Fire-boxes are of ample capacity for burning coal, coke or wood; for burning wood refuse, chips, or other inferior fuel, they are made of extra large dimensions, at a slightly increased cost. Special Straw-burning Portable Engines can also be supplied.

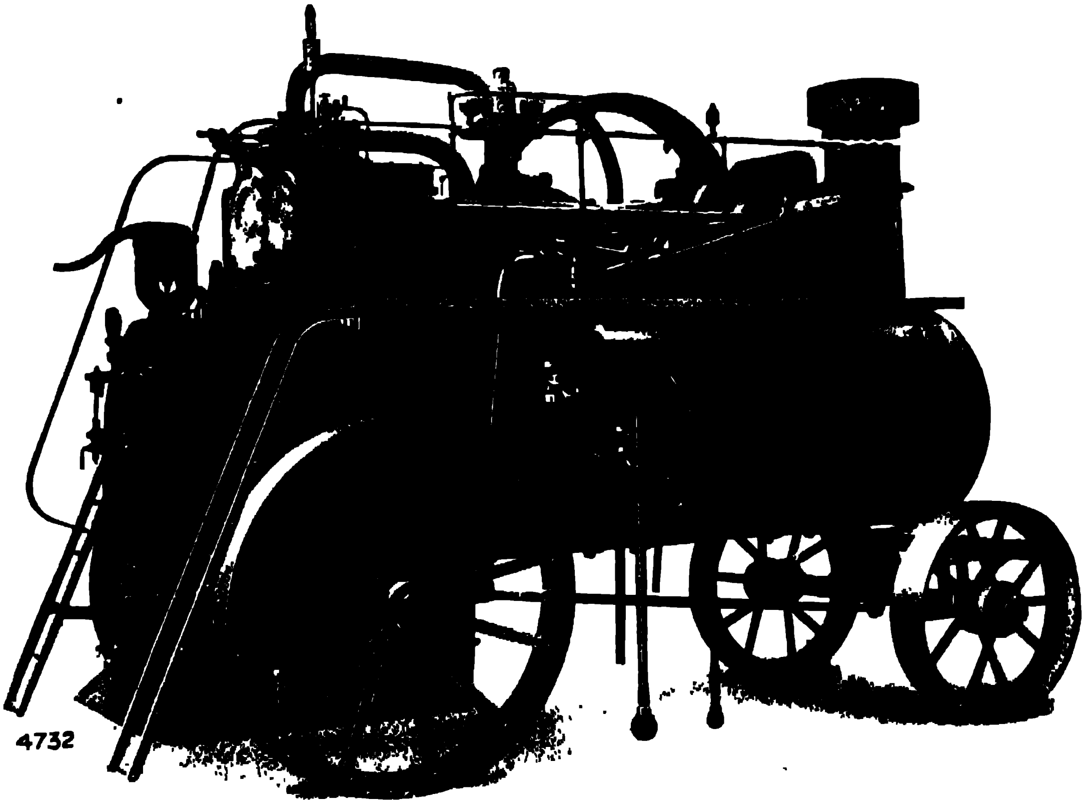
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Compound Portable Steam Engines.

Fitted with Automatic Governor Expansion Gear.



The above illustration represents a 30 Nominal Horse-Power Ransomes, Sims and Jefferies' Compound Portable Engines. The 25 and 30 H.-P. Engines are mounted on a girder frame, which is fixed on brackets on the boiler, and at any time the Engine may be taken off and worked independently.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Compound Portable Steam Engines.

Fitted with Automatic Governor Expansion Gear.

Ransomes, Sims and Jefferies' Compound Portable Engines are made from 8 to 30 Nominal Horse-Power; the nominal working pressure is 150 lbs. per square inch, and the engines will develop economically and continuously an effective or brake horse-power equal to three times their nominal power.

Compound Semi-Portable Engines can be supplied exactly similar in design, size, and power to compound portable engines, but instead of being mounted on wheels they are fixed on a strong wrought-iron pedestal under the smoke-box, with a cast-iron ash-frame under the fire-box.

The Crankshaft Brackets are of wrought-iron, and are riveted to the boiler; they are also stayed to the cylinders by strong steel stayrods, thus relieving the boiler of all strain. The crankshaft bearings are of gun-metal, with wide wearing surfaces; they are provided with large oil boxes and with a vertical and lateral adjustment to allow of the crankshaft being kept absolutely level and true.

Automatic Governor Expansion Gear is fitted to the high-pressure cylinder of these engines.

When required, these engines can be fitted with **Variable-expansion Eccentric and Single-slide Valve** to the high-pressure cylinder and **Pickering Governor** instead of the automatic governor expansion gear, when there is a **reduction in the price** as shown in the price list. At the same time Messrs. Ransomes, Sims and Jefferies, Ltd., recommend the double slides and automatic governor gear as the best arrangement.

The Feed-Pump is continuous in action and provided with treble gun-metal valves, hollow brass plunger, wrought-iron pump-rod, and wrought-iron suction and overflow pipes.

A simple Heating apparatus is arranged in connection with the feed-pump, to take supply of waste steam from the exhaust pipe; this heats the feed-water to nearly boiling point before it enters the boiler, thereby showing very economical results in working the engine.

Complete Equipment. Every engine is sent out complete with the following fittings, *viz.*:—Safety-valve with lever and spring balance, lock-up safety-valve, steam jet to chimney, gun-metal blow-off cock, 2 glass water-gauges, steam whistle, steam pressure-gauge and fusible plug in crown of fire-box; the price also includes a set of firing tools, shovel, tube brush with rod, oil-can, set of spanners, water funnel, 2 spare gauge glasses and toolbox with lock and key. The portable engines are further supplied with a large water-proof cover.

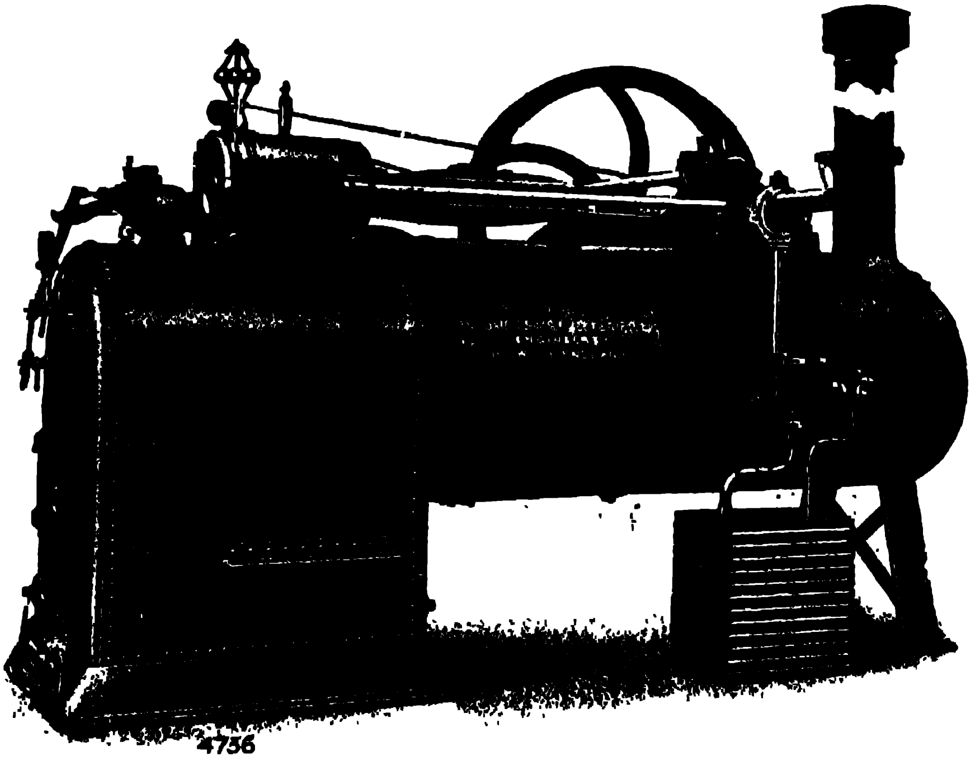
Straw-Burning. These engines may be fitted with Head and Schemioth's Apparatus for burning Straw and other Vegetable Refuse, of which Messrs. Ransomes, Sims and Jefferies, Ltd., were the original inventors and introducers, or with Elworthy's Straw-burning Apparatus.

Nominal H.-P.	CYLINDERS.			FLYWHEEL.				Price.
	Diameter high-pressure.	Diameter low-pressure.	Stroke of both cylinders.	Diameter.		Face.	Revolutions per minute.	
	ins.	ins.	ins.	ft.	ins.	ins.		Rs.
8	5¼	9	12	5	0	7	180	**10,000**
10	6½	10	12	5	0	8	180	**11,160**
12	7	11	14	5	6	8	155	**12,200**
16	8	12¾	16	5	6	10	135	**14,500**
20	9	14	16	6	0½	10	135	**16,475**
25	10	16	18	6	1½	14	120	**20,950**
30	11	17½	18	6	1½	15	120	**24,400**

Semi-Portable Steam Engines.

With the Cylinder above the Boiler.

120 lbs. Working Pressure.



These Engines are suitable for driving Winding and Hauling Machinery, Woodworking Machinery, Pumps, Machinery in Manufactories, Warehouses, Collieries, Maltkilns, Breweries, etc.

Single-Cylinder from 3 to 12 Nom. H.-P.
Double-Cylinder from 10 to 30 Nom. H.-P.

Feed Tank. A wrought-iron tank for the feed-water, as shown in the above illustration, is included in the price of the Engine.

The illustration shows an extra large fire-box for burning wood, etc. The standard fitting is with fire-box for coal.

N.B.—A Ladder is supplied with engines of 6 Nom. H.-P. and upwards.

Semi-Portable Steam Engines.

These Engines are exactly similar in design, size, and power, to the portable engines described in the preceding pages, but instead of being mounted on wheels, they are fixed on two frames or pedestals, one of which is placed under the fire-box and forms an ashpan, while the other supports the smoke-box. They can be moved from one place to another without much difficulty, and they can be arranged to receive road-wheels and fore-carriage for transporting them to their destination or for converting them into portable engines at any time. They are therefore specially adapted for work which is not of an entirely permanent character.

Semi-Portable Engines are specially recommended for export, as they possess many advantages over stationary engines with separate boilers, amongst which may be mentioned:—

A considerable saving in freight. No skilled labour is required for erecting them. No special chimney or foundations are necessary.

The Fire-boxes are made with a specially large grate area, to burn not only coal, but also any kind of ordinary firewood. For burning large logs, peat, sawdust, and other inferior fuel, the fire-boxes are made of extra large dimensions, at a slightly increased cost. Special Straw-burning Engines can also be supplied.

Testing. The boilers are tested by hydraulic pressure to 220 lbs. per square inch, and are designed for a working pressure of 120 lbs., at which pressure the engines are capable of giving off continuously an effective or brake horse-power equal to **four times their nominal power,** and, for short periods, even more, but the **continuous economical load** at which Ransomes, Sims and Jefferies, Ltd., recommend them to be used is **three-and-a-half times their nominal horse-power.**

Automatic Governor Expansion Gear, etc. These engines can be fitted with **Automatic Governor Expansion Gear with flat type Rider** valves, or Link Motion Reversing Gear. The extra wearing parts are the same as enumerated for portable engines.

Complete Equipment. The fittings and accessories for these engines are the same as specified for portable engines, with the exception of the waterproof cover, which is not supplied with semi-portable engines.

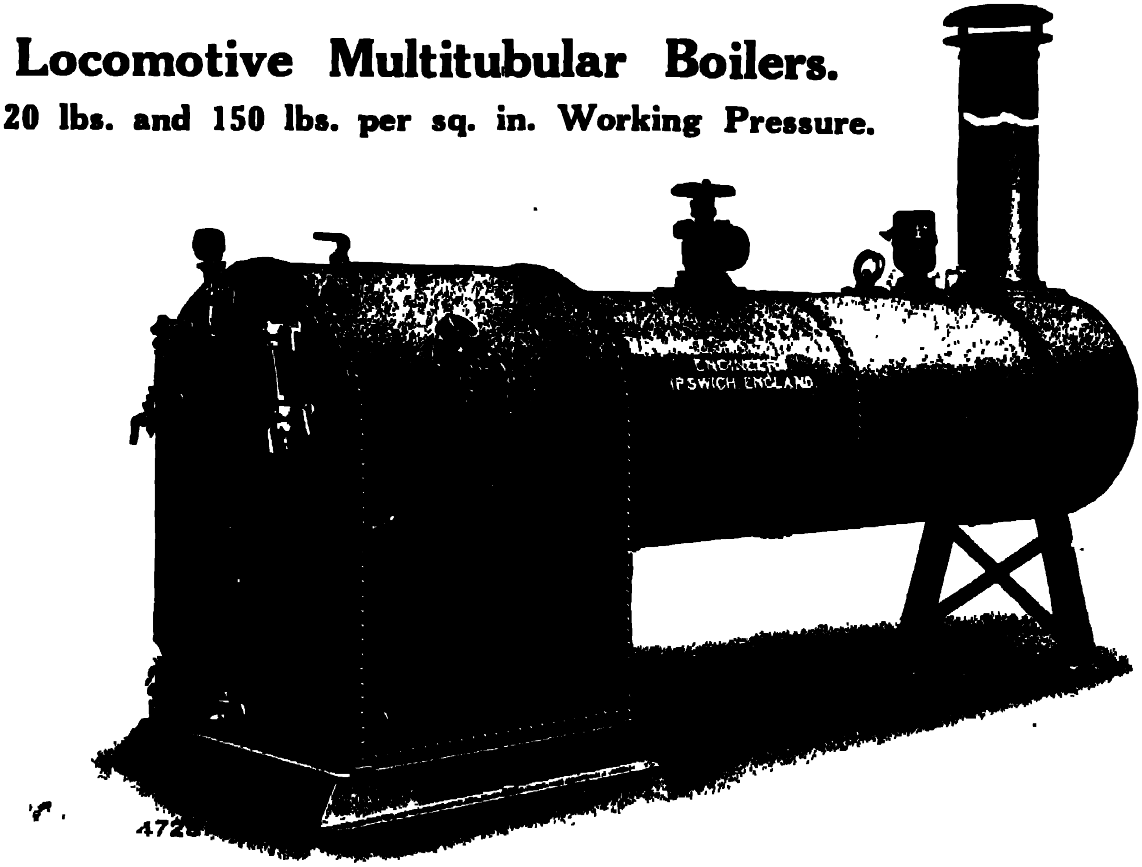
Prices.

The following figures can be deducted from the prices given on previous pages for single and two-cylinder engines to arrive at the price of the Semi-Portable Type.

Single-Cylinder Engines.		Two-Cylinder Engines.		Compound Engines.	
N.H.-P.	Deduct.	N.H.-P.	Deduct.	N.H.-P.	Deduct.
	Rs.		**Rs.**		**Rs.**
2	**140**	10	**500**	8	**600**
2½	**140**	12	**600**	10	**640**
3	**180**	14	**600**	12	**900**
4	**340**	16	**650**	16	**850**
5	**300**	20	**750**	20	**900**
6	**320**	25	**900**	25	**1,000**
7	**460**	30	**900**	30	**900**
8	**500**	....	....	....	....
10	**440**	....	....	....	....
12	**620**	....	....	....	....

Locotive Multitubular Boilers.

120 lbs. and 150 lbs. per sq. in. Working Pressure.



These Boilers, which are made from 2 to 50 Nominal Horse Power, can be strongly recommended on account of their great economy in fuel. They are constructed on the most approved locomotive system, with the largest possible water-space round the fire-box and tubes, and a proper number of holes for cleaning, etc. They are well stayed and are usually designed for a working pressure of from 100 to 150 lbs. per square inch. The fire-boxes are suitable for burning coal or wood; for burning wood refuse or other inferior fuel they can be made of extra large dimensions, at a slightly increased cost.

Lagging.—The boilers, when so ordered, are lagged with wood and covered with sheet-iron, which prevents radiation and gives them a very neat appearance.

Fittings.—Every boiler is furnished with man and mud-holes, fusible plug in crown of fire-box, blow-off cock, stop-valve, double spring-loaded safety-valve, steam jet to chimney, feed-check valve, gauge-cocks, glass water-gauge, steam-pressure gauge, whistle, set of firebars, etc. Injectors, donkey-pumps and feed-water heaters can be supplied at an extra charge if required. Boilers of 14 N.H.P. and upwards for 100 lbs. working pressure and all boilers for over 120 lbs. working pressure, have 2 glass water-gauges as shown in the illustration.

Evaporation.—The approximate evaporation of water per Nominal Horse Power per hour from and at 212° Fahrenheit is as follows:—

Boilers with a working pressure of 100 to 120 lbs. per square inch ..	100 lbs.
Boilers with a working pressure of 150 lbs. per square inch	80 „

These boilers are actually suitable for engines of the same Nominal Horse Power as given in this catalogue, but it is always advantageous to have the boiler one size larger than the Engine.

Boilers for Burning Paddy Husk.—We shall be pleased to quote for these boilers fitted with external grates of suitable size and type for burning Paddy Husk and to supply drawings with necessary instructions in such cases.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Locomotive Multitubular Boilers.

Sizes and Prices.

For Boilers of 120 lbs. Working Pressure.

These Boilers are tested by Hydraulic Pressure to 220 lbs. per sq. in.

N·H·P·	STANDARD TYPE·			COLONIAL TYPE·		
	Grate Area·	Heating Surface·	Price·	Grate Area·	Heating Surface	Price.
	sq· ft·	sq· ft·	Rs.	sq· ft·	sq· ft·	Rs·
2	2·74	41·69	1,840	3·79	44·03	2,140
2½	2·91	50·29	1,940	4·03	52·81	2,300
3	3·08	60·89	2,220	4·26	63·56	2,640
4	3·43	80·52	2,620	4·75	83·43	3,060
5	3·97	103·06	2,840	5·67	107·53	3,320
6	4·26	121·71	3,120	6·09	126·54	3,660
7	5·06	146·32	3,360	7·62	152·69	3,880
8	5·29	162·55	3,640	7·93	169·71	4,160
10	6·46	203·71	4,060	9·4	212·94	4,700
12	7·40	240·20	4,700	11·3	251·34	5,380
14	8·71	278·32	5,180	13·06	291·43	5,880
16	9·75	323·02	5,960	13·1	333·76	6,800
20	12·25	391·80	7,200	15·75	401·64	8,320
25	14·37	503·00	8,700	18·20	514·00	9,800
30	16·18	607·00	10,440	20·20	619·00	11,720
40	21·06	801·00	13,220	26·62	816·00	14,420
50	28·60	997·00	16,200	33·60	1010·00	17,540

The above Nominal Horse Power ratings are based on 100 lbs. of steam per nominal horse power per hour at easy steaming rate.

Sizes and Prices.

For Boilers of 150 lbs. Working Pressure.

N·H·P·	STANDARD TYPE·			COLONIAL TYPE·		
	Grate Area·	Heating Surface·	Price·	Grate Area·	Heating Surface·	Price·
	sq· ft	sq· ft·	Rs·	sq· ft·	sq ft·	Rs·
8	4·00	150·75	4,700	5·50	154·86	5,380
10	4·95	180·00	5,040	6·86	185·38	5,840
12	5·82	211·27	5,460	8·15	218·18	6,320
16	7·92	301·01	6,660	9·90	310·33	7,680
20	9·94	374·14	8,200	12·07	380·78	9,580
25	12·88	450·81	10,260	15·29	458·03	11,640
30	15·66	572·14	11,980	18·27	579·65	13,540
40	19·16	731·49	16,660	22·98	742·99	18,240
50	24·10	923·67	18,760	27·50	932·53	20,480

The above Nominal Horse Power ratings are based on 80 lbs. of steam per nominal horse power per hour at easy steaming rate.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

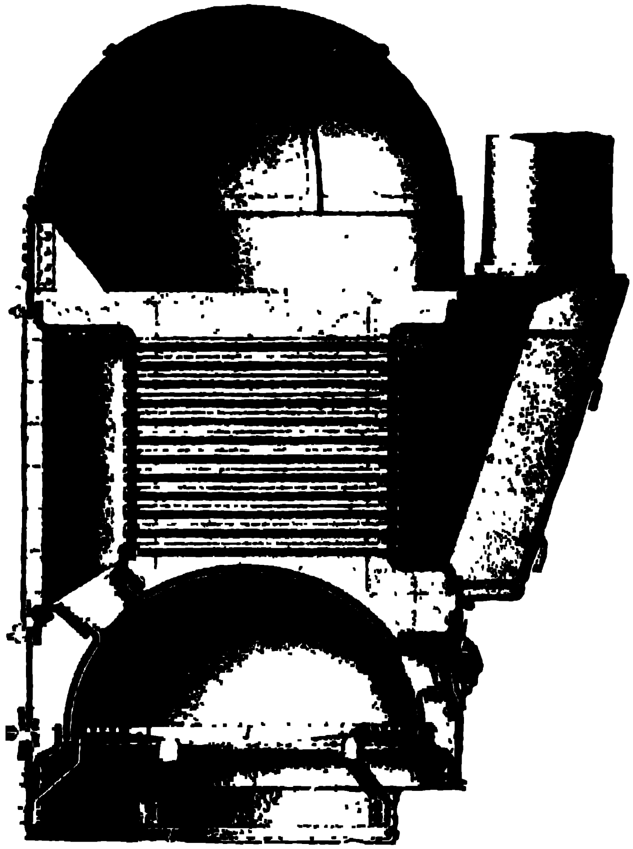
RANGOON, MADRAS,
BOMBAY, LONDON.

Cochran Vertical Boilers.

We are Sole Agents in Burma and on the East and South of India for Messrs. Cochran (Annan), Ltd., the makers of this efficient type of Vertical Boiler which bears their name and we carry a stock of useful sizes.

The design of the Cochran Boiler is shown in the sectional view on this page. It will be noted that it is of the multitubular type which gives a very large heating surface while at the same time perfect accessibility for cleaning has been kept in view. The overall size of the boiler is rather less than that of the ordinary cross tube type of equal steaming capacity and this result has been obtained without sacrificing the space necessary for the proper combustion of the fuel before it reaches the chimney.

Cochran Boilers are made of the very best materials throughout and both as regards design and workmanship are superior in every way to the plain cross tube type. A careful inspection of the two will convince the engineer that the Cochran Boiler stands in a class by itself. A special feature of the construction is the use of hydraulically pressed steel plates, necessitating the minimum of riveted joints and surfaces requiring stays. The fire-box shell is a single semi-spherical plate without seam or weld, giving the greatest freedom to expansion and contraction, the greatest possible strength, and obviating the necessity for stays—with the attendant possibilities of corrosion and leakage. Its strength has been proved by it being subjected to a pressure of 1,000 lbs. per square inch without showing signs of collapse. The ample water space round the fire-box and space available for entry to clean the same is a specially valuable feature in cases where good water cannot be obtained for boiler feed.



After leaving the fire-box, the products of combustion enter a combustion chamber and thence pass through the horizontal tubes to the smoke-box on which the chimney is mounted. There is thus ample time for complete combustion to take place and for the heat of the gases to pass to the water. The space available for combustion and the heating surface secured is responsible for the very high efficiency of this type of boiler.

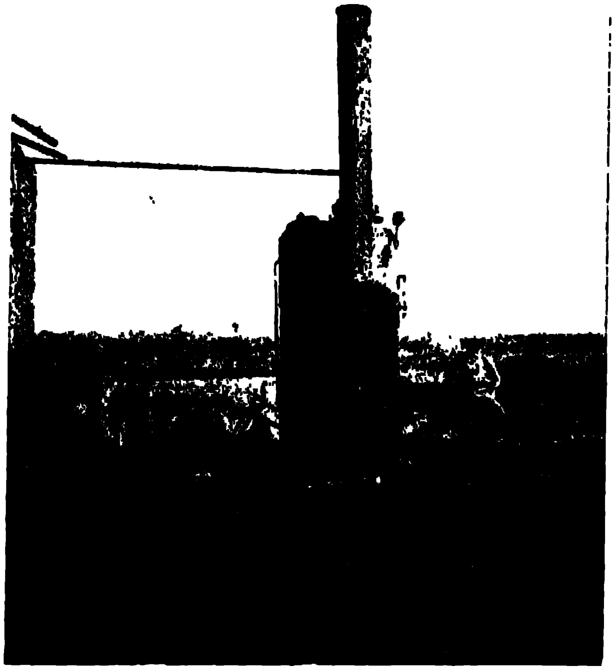
Both sides of the tube plate can be opened for inspection and the smoke-box end is fitted with doors which can be opened whenever desirable for cleaning the tubes. There is ample space between the outer tubes and shell to permit of access for cleaning.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Cochran Boilers.



Made in 1888. Still working at JOGTA COLLIERY, SIJUA. (Messrs. Agabeg Bros.)

The spherical construction of the fire-box is reproduced in the boiler crown which consequently requires no stays. A very ample steam space is provided.

Vertical Boilers are frequently supplied with cheap grade mountings which invariably give trouble after a few years' service. Mountings of substantial weight and good design are supplied with even the smallest Cochran Boilers and no attempt has been made to cheapen construction in this direction.

It is not uncommon to find that engineers, while admitting the advantages of a multitubular design, are inclined to question its suitability where good feed water is not obtainable. It is in this respect that the Cochran design is better than its competitors, as it is the most accessible vertical boiler in the market. There is space between the tubes and the shell for a man to get down to clean between tubes and over the furnace and there is no restricted annular space between the shell and the furnace where deposit is most likely to occur and where scraping of the plates from the inside is difficult, if not impossible.

The Cochran Boiler is necessarily a more expensive type than the plain vertical cross tube boiler, but all engineers who have had practical experience with Cochran Boilers are ready to admit that the saving in fuel and the longer life of the boiler fully justify the extra first cost.

Some Users of Cochran Boilers in India and Burma.

Railways.

Bengal-Nagpur Railway (several).
Great Indian Peninsular.
Bombay, Baroda and Central India (several).
Oudh and Rohilkhand Railway.
Gwalior Light Railways.
South Indian Railway.
Burma Railway Co. (several).

Collieries and Mines.

East Bagdigi Colliery Co. (Jharia).
Huntodih Colliery (Mohuda).
Jogta Colliery (Sijua).
Cape Copper Co. (several).
Burma Gold Dredging Co.

Miscellaneous.

Bombay Port Trust.
Rangoon Port Trust (Disinfecting Station).
Rangoon Jail.
Punjab Oil Mill, Cawnpore.
Baroda State.
Benares Hindu University.
Berhampur Water Works.
Government Distillery, Bombay.
Mag Bathan Distillery, Bassein.
Upper Burma Wood Co.
Reliance Firebrick and Pottery Co.
Good Hope Tea Estate.
Shiyali Co-operative Society, S.I.
V. B. Ravada & Co., Trichinopoly.
Numbers of Rice Mills and small Industrial Concerns.
Messrs. Andrew Yule & Co., Ltd.
Messrs. The Asiatic Petroleum Co.
Messrs. Shaw Wallace & Co.
Messrs. Martin & Co.
Messrs. The British-American Machinery Co.
Messrs. Bulloch Bros., Rangoon.
Messrs. Douglas and Grant, Ltd.
Messrs. Carew & Co. (Sugar Works, Shahjehanpur).

Sizes and Evaporative Capacities of Cochran Boilers.

No.	Diameter of Boiler.		Height of Boiler.		Grate Area.	Heating Surface.	Ratio H.S./G.A.	COAL.		EVAPORATION.			No.	Approx. N.H.P.
								Lbs. per hour.	Lbs. per sq. ft. of Grate per hour.	Per lb. Coal.	Per sq. ft. H.S. per hour.	Total per hour.		
	ft.	ins.	ft.	ins.	sq. ft	sq. ft.								
1	3	0	6	9	4·75	60	12·6	72	15·1	5·0	6·0	360	1	4
2	3	3	7	6	5·75	80	14·0	98	17·0	5·1	6·2	500	2	6
3	3	9	8	6	7·50	100	13·3	144	19·3	5·0	7·2	720	3	8
4	4	0	9	0	8·50	120	14·1	170	20·0	5·1	7·2	868	4	10
5	4	3	9	6	9·25	140	15 1	188	20·4	5·2	7·1	996	5	11
6	4	6	10	0	9·75	160	16·4	202	20·8	5·4	6·8	1,098	6	12
7	4	9	10	3	11·75	200	17·0	253	21·6	5·5	7·0	1,401	7	16
8	5	0	11	3	12·50	220	17·6	273	21·8	5·6	6·9	1,531	8	17
9	5	3	11	9	14 00	250	17·8	312	22·4	5·6	7·0	1,760	9	20
10	5	6	12	3	16·75	300	17·9	383	22·7	5·6	7·2	2,160	10	24
11	5	9	13	0	18·75	350	18 7	435	23·3	5·7	7·1	2,504	11	28
12	6	0	12	6	18·75	350	18·7	435	23·3	5·7	7·1	2,504	12	...
13	6	0	13	6	18·75	350	18·7	435	23·3	5·7	7·1	2,504	13	..
14	6	0	14	0	18 75	400	21 4	435	23·3	6·1	6·6	2,667	14	..
15	6	6	13	6	22·50	450	20·0	533	23·7	5·9	7·0	3,144	15	..
16	6	6	14	0	22·50	450	20·0	533	23·7	5·9	7·0	3,144	16	..
17	6	6	14	6	22 50	500	22·2	533	23·7	6·2	6·6	3,304	17	. .
18	7	0	14	0	26·75	500	18·7	643	24·0	5·7	7·3	3,665	18	.
19	7	0	15	0	26 75	600	22·4	643	24·0	6·3	6·7	4,021	19	..
20	7	6	16	3	31·50	750	23 8	767	24·3	6·5	6·6	4,939	20	..
21	8	0	16	6	37·00	850	23 0	906	24·5	6·3	6·7	5,760	21	
22	8	6	17	0	41·00	1,000	24·4	1,004	24·5	6·5	6·6	6,610	22	...

Note.—When working at 75 per cent. of the above evaporative rates an economy of about 60 per cent. in coal consumption can be obtained. To obtain the best results from Cochran Boilers it is essential that a chimney of adequate height should be fitted. We shall be glad to advise buyers regarding this.

It should be noted that Cochran Boilers are made in much larger sizes than ordinary Vertical Cross tube Boilers and can be recommended for use in cases where Cornish and Lancashire Boilers requiring expensive brickwork settings and flues are often installed. The No. 22 size is equivalent to 30 feet by 8 feet diameter Lancashire Boiler.

Size.	Evaporation.	Price and Specification.		Size.	Evaporation.	Price No. 3 Specification.
		No. 1.	No. 2.			
		Rs.	Rs.			Rs.
1	360	3,515	4,070	12	2504	8,455
2	500	3,765	4,295	13	2504	8,455
3	720	4,125	4,655	14	2667	8,760
4	868	4,525	5,055	15	3144	9,310
5	996	5,095	5,625	16	3144	9,310
6	1098	5,740	6,270	17	3304	9,540
7	1401	6,160	6,690	18	3665	10,300
8	1531	6,710	7,240	19	4021	10,640
9	1760	7,165	7,695	20	4939	13,075
10	2160	7,715	8,265	21	5760	14,385
11	2504	8,630	9,180	22	6610	16,910

No. 1 Specification includes all fittings and mountings with additions of White's one-movement injector and maker's standard size chimney.

No. 2 Specification includes all fittings and mountings with additions of Tangye's Duplex Feed Pump and maker's standard size chimney.

No. 3 Specification includes all fittings and mountings only.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

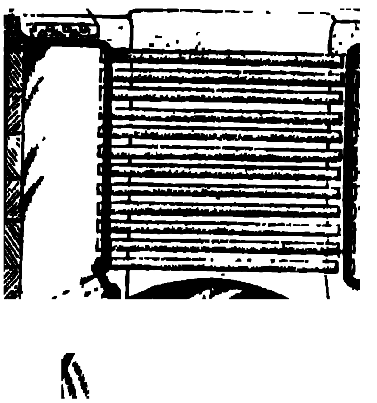
JESSOP & Co. LTD
ENGINEERS

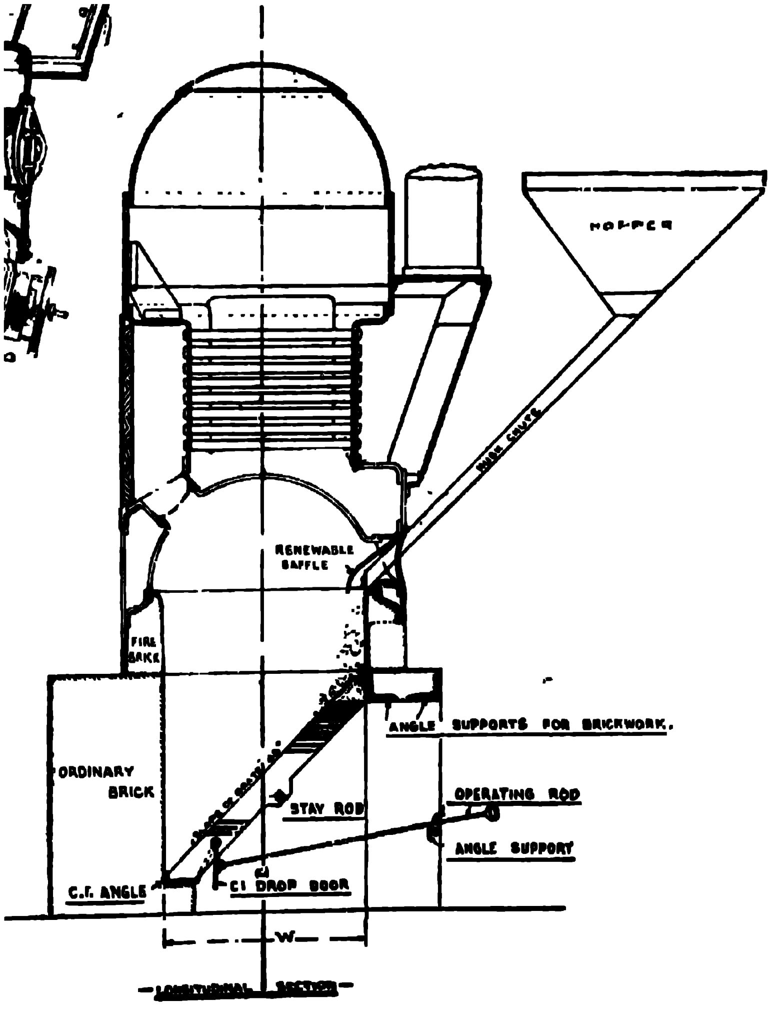
RANGOON, MADRAS,
BOMBAY, LONDON.

Cochran Multitubular Boilers for Special Purposes.

The standard sizes of Cochran Boilers can readily be modified to suit special cases and are regularly employed as Waste Heat Boilers in connection with Annealing Furnaces, etc.

The lower illustration shows a Boiler fitted with a special grate for burning sawdust, paddy husk or other light fuels as used in the Bassein Mills. We have supplied large numbers of these to Rice-Mills in Burma and it is found that with the Cochran Boiler the paddy husk available from a Rice Mill is sufficient to raise all the steam necessary for working the mill machinery.





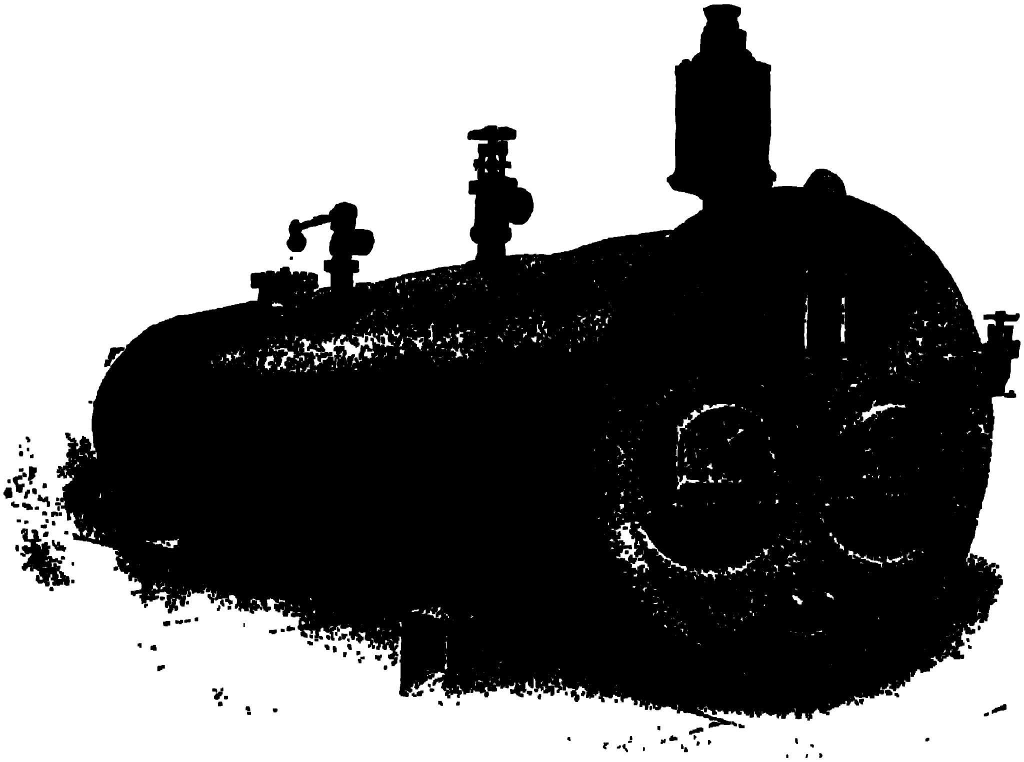
Oil Fired Boilers.—The illustration above shows one of several arrangements which can be adapted when oil fuel is available at cheap rates. We shall be glad to send a separate booklet on Oil Fired Boilers to any Engineers interested in the subject.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Lancashire Boilers.



We shall be pleased to quote for High Class Lancashire Boilers made by the best British makers.

The Boilers will be made entirely of specially selected Siemens-Martin Mild Steel Plates, Boiler quality. Each Boiler is tested to 1¾ times its working pressure and constructed throughout in accordance with Provincial Boiler Rules for the required working pressure.

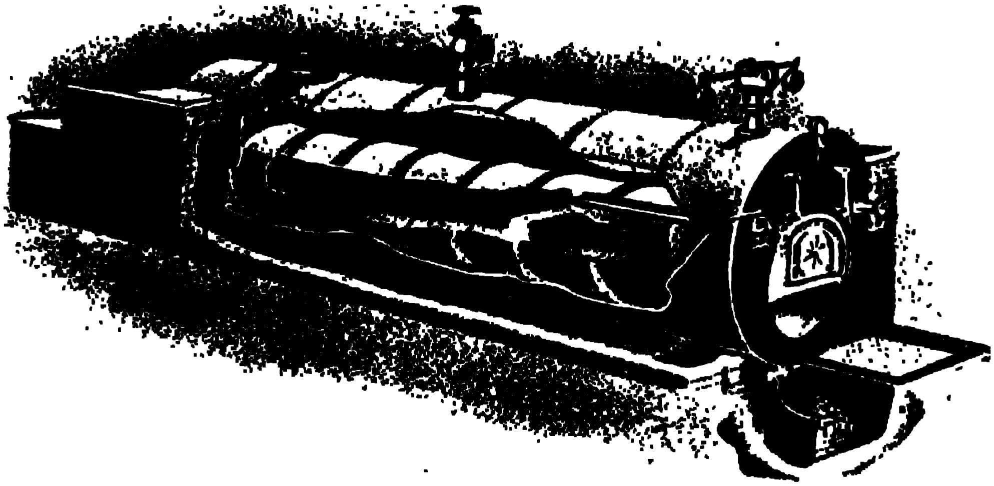
Fittings include **Accessible Check Feed Valves, Junction Valve, Spring Lock-up Type Safety Valve, Compound High Steam and Low Water Valve, Steam and Pendant Water Gauge Cocks, Blow-off Cock, Furnace Fronts, Patent Dampers, and Flue Doors, etc., etc.**

Every Boiler is painted with Red Oxide Paint.

Length.	Diameter.		Outside Diameter of Flue.		Lbs. of Water Evaporated from and at 212° Fah. per Hour.	I.H.P. based at 20 lbs.	Approximate Weights in cwts. for the Undernoted Pressures.							Weight of Fittings in cwts.
							80	100	120	150	160	180	200	
ft.	ft.	ins.	ft.	ins.										
20	6	0	2	3	2,700	135	155	160	175	200	215	240	260	50
22	6	0	2	3	3,000	150	165	170	185	215	225	250	275	50
24	6	0	2	3	3,300	165	180	185	200	240	252	275	295	50
22	6	6	2	6	3,400	170	190	200	215	260	285	300	325	55
24	6	6	2	6	3,800	190	200	210	230	275	305	330	345	55
24	7	0	2	9	4,200	210	215	230	260	335	345	365	435	60
28	7	0	2	9	5,000	250	248	265	304	365	375	410	450	60
30	7	0	2	9	5,500	275	260	285	320	395	405	445	530	60
24	7	6	3	0	4,500	225	250	260	305	370	375	430	465	65
28	7	6	3	0	5,500	275	275	300	335	405	425	480	520	65
30	7	6	3	0	6,000	300	285	340	355	430	442	495	550	65
30	8	0	3	3	6,700	335	320	375	410	475	510	585	635	70
30	8	6	3	5	7,500	375	367	405	460	560	590	660	750	75
30	9	0	3	8	9,000	450	405	465	530	615	650	700	840	80

Detailed Specifications and Prices on Application.

Cornish Boilers.



We shall be pleased to quote also for Cornish Boilers generally as per specification on previous page

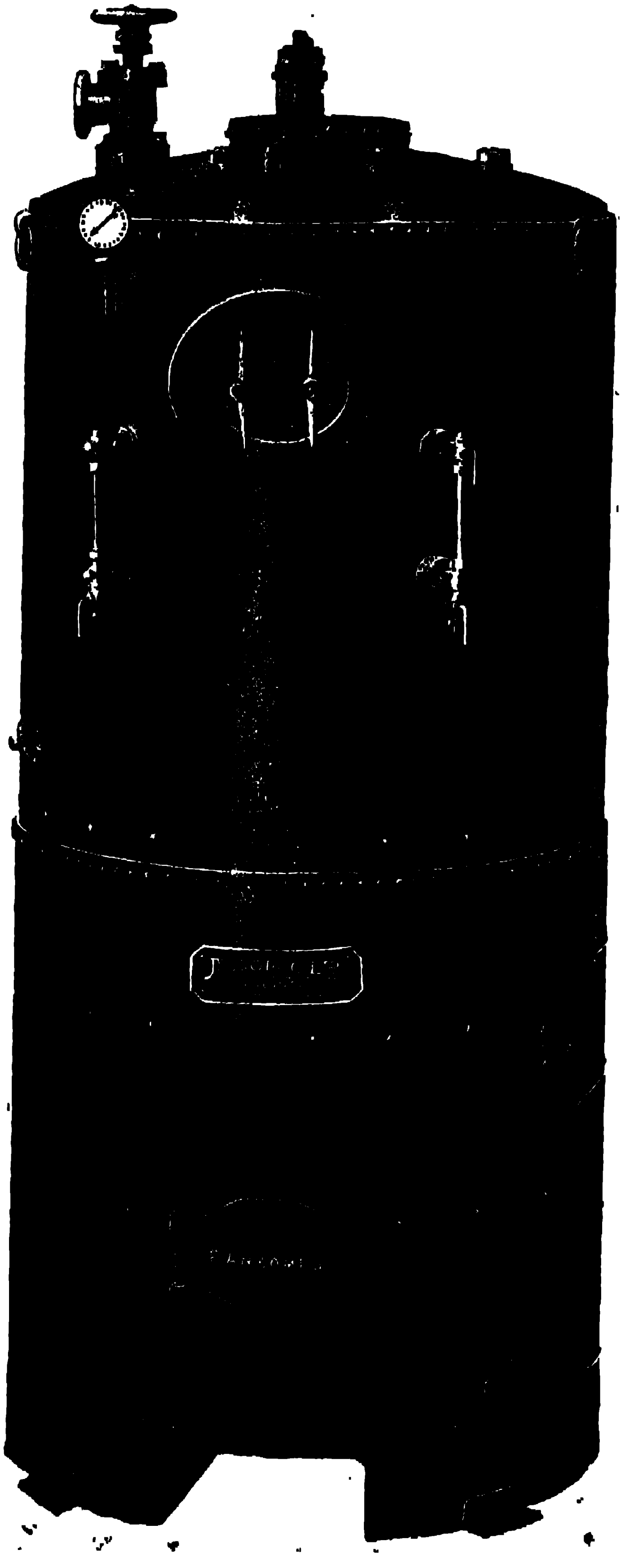
Fittings include Accessible Check, Feed Valve, Juncture Valve, Spring Lock-up Type Safety Valve, Compound High Steam and Low Water Valve, Steam and Pendant Water Gauge Cocks, Blow-off Cock, Furnace Fronts, Patent Dampers and Flue Doors, etc., etc. Every Boiler is painted with Red Oxide Paint.

Length.	Diameter.		Outside Diameter of Flue.		Lbs. of Water Evaporated from and at 212 Fah. per Hour.	I.H.P. based at 20 lbs.	Approximate Weights in cwts. for the Undernoted Pressures.				Weight of Fittings in cwts.
							80	100	120	125	
ft.	ft.	ins.	ft.	ins.							
12	4	6	2	3	1,100	55	70	72	75	75	25
14	4	6	2	3	1,300	65	72	75	78	78	25
14	5	0		6	1,400	70	84	86	93	93	30
15	5	0			1,500	75	88	90	95	95	30
16	5	0			1,540	77	90	92	100	100	30
18	5	0			1,700	85	102	105	112	115	35
20	5	0			1,800	90	110	114	120	123	35
18	5	6			1,800	90	110	115	130	135	40
20	5	6			2,000	100	116	128	138	145	40
18	6	0			2,000	100	130	138	143	150	40
20	6	0			2,200	110	135	147	154	160	40
22	6	0			2,400	120	146	156	170	175	40
24	6	0			2,600	130	150	160	175	185	40

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Ransomes' Vertical Cross Tube Boiler.

Ransomes' Vertical Cross Tube Boilers.

We illustrate a high class Vertical Cross Tube Boiler which is made in a large number of sizes by Messrs. Ransomes, Sims and Jefferies, Ltd., and which embodies several details of construction which will appeal to discriminating buyers.

The Boilers are slightly more expensive than the ordinary Cross Tube Boilers and are above the strict requirements of the Indian Boiler Act as applying to the particular pressure for which they are constructed. Owing to their superior construction they have an established reputation with buyers such as The Indian Railways, Public Works Department, Public Health Department, etc., as they are recognised to be of superior construction throughout.

The following are a few of the special features of these Boilers:—

(1) Extra large heating surface in relation to grate area, promoting economy in fuel.

(2) Protecting Sleeve inside Chimney Uptake, preventing contact of furnace gases with that part of the Uptake which passes through the steam space.

(3) High Class Flanged fittings fixed to steel projecting pads, riveted to the Boiler. (Vertical Boilers are usually fitted with cheap screwed fittings which do not give the same satisfactory service as the flanged fittings used on other types of Boilers.)

The following tables give particulars of two designs of Boilers which Messrs. Ransomes, Sims and Jefferies, Ltd., can offer. Both are complete with fittings and mountings including double spring Safety Valve and can be offered with Injectors or Feed Pumps as required. The Boiler seams are caulked both inside and out, and of first class workmanship.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Leading Particulars ("J" Series) per 100 lbs. Working Pressure.

N.H.P.	1½	2	3	4	6	8	9	10	12	14	16	20
Mark	RB	RC	JL	JM	JN	JO	RP	JQ	JR	JS	JT	JU
Diameter	2′-0″	2′-3″	2′-6⅝″	2′-9″	3′-3″	3′-9″	3′-9″	4′-3″	4′-6″	4′-9¾″	5′0 13/16″	6′0 1/16″
Height	5′-5⅜″	5′-6″	6′-0″	6′-9″	7′-9″	8′-6″	10′-0″	9′-5″	10′-5″	11′-1″	12′-5″	13′-0″
Thickness of Shell ..	5/16″	5/16″	5/16″	5/16″	⅜″	7/16″	⅜″	⅜″	⅜″	⅜″	13/32″	15/32″
,, ,, Fire-box ..	5/16″	⅜″	⅜″	⅜″	⅜″	13/32″	7/16″	15/32″	½″	17/32″	17/32″	⅝″
Shell Crown	5/16″	⅜″	⅜″	⅜″	⅜″	9/16″	7/16″	½″	½″	½″	9/16″	9/16″
Fire-box ,, ...	5/16″	⅜″	⅜″	⅜″	⅜″	13/32″	7/16″	½″	½″	½″	9/16″	9/16″
No. of Cross Tubes ..	1	1	1	2	2	3	4	3	4	4	4	4
Heating Surface .. sq. ft	17·5	21	25	33·5	47	68	92	91	110	130	143	184
Grate Area .. ,,	1·72	2·34	3·25	4	6	8	8	10·5	12	13·75	15·5	22·75
Approximate Weight cwts.	13	14	18	24	30	45	49	55	65	77	88	105

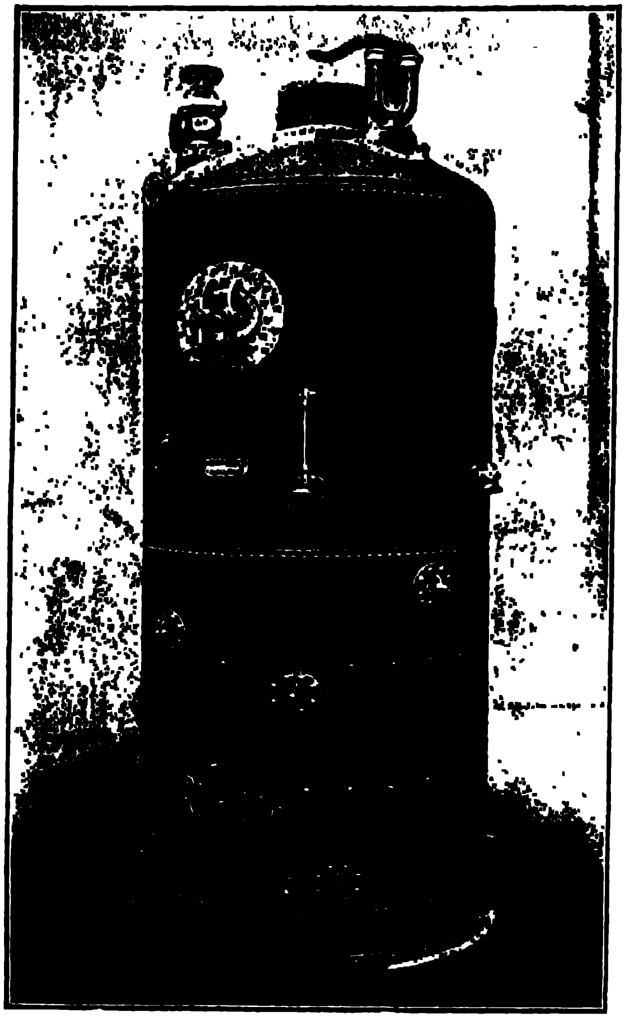
Leading Particulars ("R" Series) per 100 lbs. Working Pressure.

N.H.P.	1½	2	2½	3	4	5	5½	6	7	8	10	12	14	16	20	25
Mark	B	C	D	E	F	G		H		J	K					
Diameter ..	2′-0″	2′-3″	2′-6″	2′-6″	2′-9″	3′-0″	3′-3″	3′-6″	3′-9″	4′-0″	4′-3″	4′-6″	4′-9″	5′-0″	5′-6″	6′-0″
Height ..	5′-2″	5′-2″	5′-3″	6′-4″	6′-10″	7′-4″	8′-0″	8′-10″	9′-6″	9′-11″	10′-5″	11′-6″	12′-6″	13′-6″	14′-6″	15′-6″
Thickness of Shell	5/16″	5/16″	5/16″	5/16″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	13/32″	7/16″	15/32″
,, ,, Crown	5/16″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	13/32″	7/16″	7/16″	½″	½″	½″	9/16″	9/16″	19/32″
,, ,, Fire-box	5/16″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	13/32″	7/16″	7/16″	15/32″	½″	17/32″	17/32″	21/32″	11/16″
Thickness of Fire-box Crown ..	5/16″	⅜″	⅜″	⅜″	⅜″	⅜″	⅜″	7/16″	7/16″	½″	½″	½″	½″	9/16″	9/16″	11/16″
No. of Cross Tubes	1	1	1	2	2	2	3	4	4	4	4	4	4	5	5	5
Heating Surface sq. ft.	17·5	21	25·5	32·5	40·5	48	60	78	92	108	120	129	153	179	207	275
Grate Area ,,	1·72	2·34	3·2	3·25	4·05	5·0	6·0	7·7	8·0	9·28	10·5	11·75	13·5	15·0	18·75	22·75
Approx. Weight cwts.	12	13	16·5	22	25	28	32	43	42	49	56	67	80	90	105	130

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.



Vertical Boilers.

In designing these Boilers, special attention has been given to providing an ample margin of grate area and heating surface, so that the full horse-power can be exerted, without having recourse to the excessive firing which is so detrimental to the life of a Boiler.

The Boilers are made of the best mild steel plates; they are designed for **Working Pressures of 100 lbs. per square inch,** and are tested by water to double these pressures. **All Boilers are suitably stayed to suit the requirements of the All-India Boiler Rules.**

The fittings, which are included in the price, consist of:—Safety Valve, Stop Valve, Steam Pressure Gauge, Water Gauge, Feed Check Valve, Test Cocks, Blow-off Cock, Fire-box Doors, Firebars, Bearers, Washout Plugs and Chimney.

The boilers can be supplied with either Injectors of Gresham's or other types or Donkey Feed Pumps as preferred. Feed Pumps are usually of the Mumford Type bolted to the side of the boilers.

Nominal Horse-Power.		100 lbs. Pressure.								
		3	4	6	8	10	12	14	16	20
Diameter of Boiler ..	..	2′ 6″	2′ 9¼″	3′ 3″	3′ 9″	4′ 3″	4′ 6″	4′ 9″	5′ 0″	6′ 0″
Height	..	6′ 0″	6′ 9″	7′ 9″	8′ 6″	9′ 5″	10′ 5″	11′ 1″	12′ 5″	13′ 0″
Number of Cross Tubes ..	..	1	2	2	3	3	4	4	4	4
Diameter	..	0′ 8″	0′ 7″	0′ 9″	0′ 8″	0′ 9″	0′ 9″	0′ 10″	0′ 10″	0′ 10″
Heating Surface ..	sq. ft.	25	35	48	70	80	110	120	130	160
Grate Area ..	„	3	3·5	5·5	7·5	10·5	12	13·5	15	22·5
Weight—Approximate in ..	cwt.	14½	20	28	40	50	64	76	83	107
Price, complete with Injector	**Rs.**	**1,130**	**1,360**	**1,550**	**1,990**	**2,450**	**2,970**	**3,330**	**3,550**	**4,790**

Note.—Sizes and particulars given above are approximately correct but different makers' Standard Boilers may differ slightly from the table.

TANGYE'S GAS OIL ENGINES

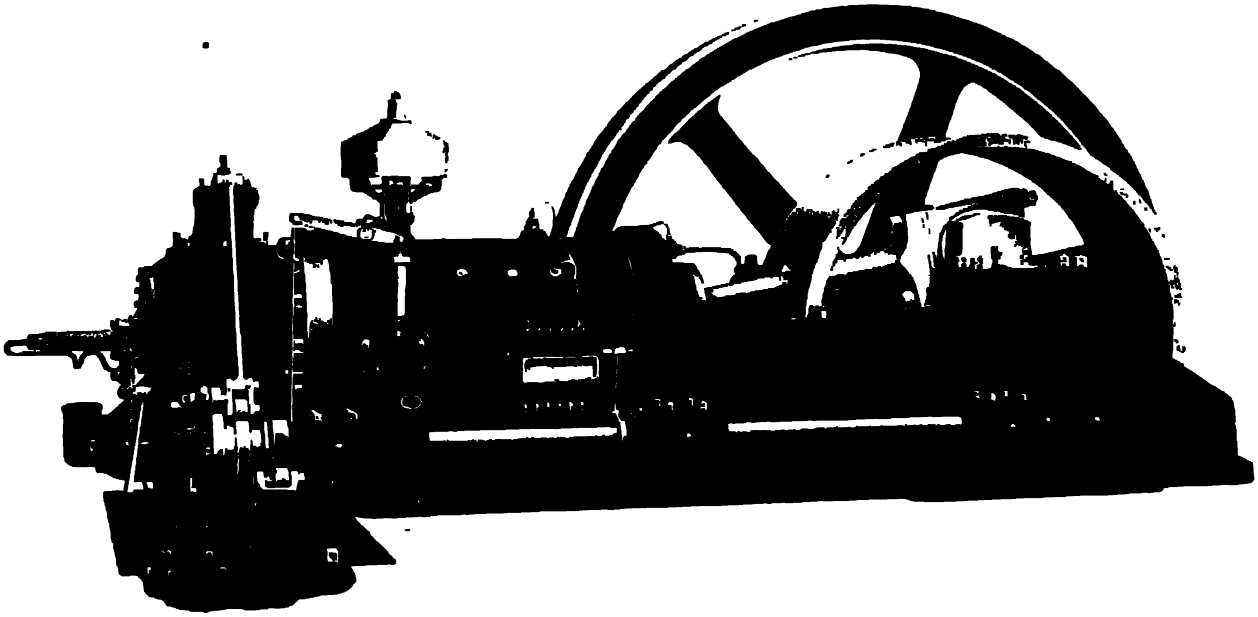
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Heavy-Oil Engines.

Gold Medal Award, Calcutta Exhibition, 1923-24.



In sizes up to 500 B.H.P.

For all Fuels and for Tar Oils.

All Engines supplied with Compressed Air Starter and Air Reservoirs.

Lowest Fuel consumption.

Organised Spare Part Service.

Expert advice and erection under European supervision.

Thousands of horse-power already supplied in India for all classes of work.

Tangye's Heavy Oil Engine.

Cold-Starting Type.

(*Fully protected by Patents.*)

Introduction.

Messrs. Tangyes Limited have from the early days of Crude Oil Engine design occupied a leading place among British makers of the higher compression type of engines and many of the early Crude Oil Engines made by them are still doing regular service in India. During the past seven years, rapid developments in design have resulted in extraordinarily low fuel consumptions being attained with engines as simple to work and no more expensive in first cost, than their fore-runners. The result is that what is now known as the Heavy Oil Engine (Cold-Starting Type) is for economy and moderate capital cost, almost the only firm of prime mover which can be considered for power installations up to about 300 B.H.-P.

During the last ten years it is remarkable to what an extent Crude Oil and Heavy Oil Engines have replaced and supplanted Steam Engines in India, while the increasing demand each year for Tangye's Engines is testimony to the popularity and success of engines of that make supplied by us and justifying the choice of their owners.

The present Tangye Heavy Oil Engine differs from the older "crude oil" type in the manner in which the ignition of the working charge is effected. Until recent years all crude oil engines were fitted with a vaporiser or hot bulb, attached to and in direct communication with the combustion chamber. This vaporiser was heated before starting by means of a powerful blow lamp and when sufficiently hot, the engine was started either by hand or compressed air, the charge being ignited by contact with the hot bulb. After starting up, the blow lamp was removed, as the heat of the exploding charges was sufficient to maintain the temperature of the vaporiser; so much so, that, unless some method of cooling was adopted, the vaporiser rapidly became too hot and caused pre-ignition and loss of power. Water injection was introduced for this purpose and a valve controlled by the governor varied the amount according to the load on the engine. This, however, could not be made entirely automatic and hand control was necessary if the best results were to be obtained. (There are numbers of engines on the market which still rely on hot bulb ignition.)

In the type of engine now introduced, the starting lamp and the vaporiser with its water injection and attendant complication has been entirely eliminated.

This has been effected by increasing the compression to a small extent so that the resulting temperature is sufficient to ignite the charge without any external aid in the shape of a hot bulb or vaporiser; there is therefore no part of the cylinder or combustion chamber which is not entirely water jacketed. Excessive rise of temperature is rendered impossible and complete combustion and correct timing is effected at all variations of load. The engine is thus entirely automatic in action and no adjustment of any kind is required while the engine is running.

The increased compression has also rendered it possible to start the engine without any preliminary heating.

A charge of air is admitted from the air receiver and the momentum attained thereby is sufficient to enable the engine to pass the first compression and so ignite the charge. The engine will then continue to fire automatically as long as the fuel oil is allowed to enter the combustion chamber.

A further important advantage gained due to use of a higher compression is that the fuel consumption is much less than any hitherto attained in engines of this class, being only 0.42 lbs. of fuel oil per B.H.-P. hour at working load for engines of 66 B.H.-P. and more. **We would particularly impress upon our constituents that this figure is not the best obtained under test conditions, but one that can be achieved in practice in an Indian Factory.**

Tangye's Heavy Oil Engine.

Cold-Starting Type.

(*Fully protected by Patents.*)

Gold Medal Awarded.

General Description.

Design.—The construction of the Engine is substantial and well-proportioned, and Tangyes Limited have introduced many improvements suggested by their extensive experience in the manufacture of Internal-Combustion Engines, extending over a period of considerably more than a quarter of a century.

Supported Cylinder.—The cylinder casing is cast with and forms part of the bedplate and is supported throughout its full length.

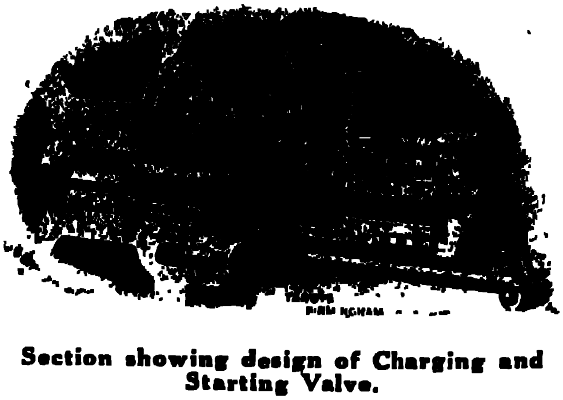
Balanced Crankshaft.—The crankshaft is of selected mild steel, made from one forging with throw slotted out, and with a crank pin of large diameter; it is machined all over and runs in adjustable bearings lined with anti-friction metal. The to-and-fro movements of the parts in motion are directly counterbalanced by weights secured to the crank webs.

Combustion Chamber.—The combustion chamber, which is a separate casting, is symmetrical in design and construction, and the disposition of the various valves arranged so as to render them easy of access for examination and cleaning purposes. Ample space is provided for the free circulation of the cooling water, in order to prevent the possibility of excessive heating from the ignited charges.

Removable Liner.—The liner, which is made of specially hard cast-iron, can be easily removed in case of renewal without the necessity for returning the cylinder to the works. The piston is carefully ground and fitted to the cylinder liner to ensure gas-tight fit.

Starting.—A compressed air receiver is supplied for starting purposes with all sizes of Single Cylinder and Coupled Engines. The air receiver is fitted with pressure gauge and retaining valve—the Engine Cylinder (each cylinder of the Coupled Engine) being provided with a combined charging and starting valve.

The **184 B.H.-P.** to **250 B.H.-P.** sizes of the Coupled Engines are provided with a separate starting Engine, using Kerosene as fuel, with an air compressor fixed on the side of the bedplate for charging the air receiver.



Section showing design of Charging and Starting Valve.

Tangye's Heavy-Oil Engine.

General Description.

First Starting of Engine.—For the purpose of first setting the Engine into motion when no compressed air is available, a heating lamp and patented ignition plug are supplied. These are not required again unless the compressed air has been allowed to escape out of the receiver.

Flywheel.—The flywheel of the Coupled Engines is made in halves with machined joints securely bolted together. The Single Cylinder Engine flywheels are whole, with the exception of the **105 B.H.P.** and **125 B.H.P.** sizes of the Electric Lighting Type, which are made in halves.

Barring Gear.—All sizes of the Coupled Engines are provided with barring gear, consisting of hand-wheel and pinion engaging with teeth cast in the flywheel. Barring gear is included with the **105 B.H.P.** and **125 B.H.P.** sizes for General Purposes, and also with the **77 B.H.P.** and larger Single Cylinder Engines for Electric Lighting.

Sideshaft.—The sideshaft is of steel, fitted with machined cams, and driven through machine-cut skew-gear wheels working in an enclosed oil bath.

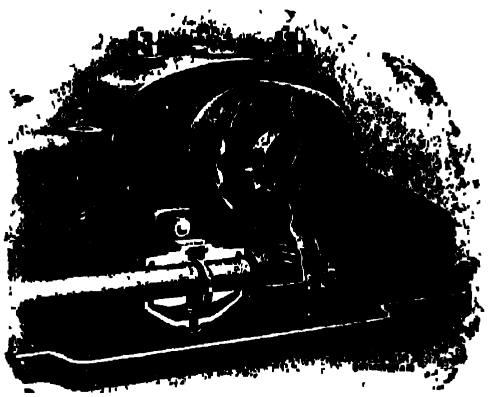


Illustration showing the Gear Wheels and Oil Bath.

Oil Pump and Operating Gear.—The whole arrangement of the pump and operating gear is somewhat novel and most effective; on the upward stroke of the pump plunger fuel oil is drawn through the suction valves, and on the quick down stroke forced through the delivery valve and connections to the spraymaker on the combustion chamber. All the valves and parts that may require examination are arranged so as to be easily taken asunder for that purpose. A packing gland of usual construction is used for keeping the plunger oil tight. The stroke of the pump plunger is in proportion to the work being performed by the Engine, and the working strains are thereby reduced accordingly.

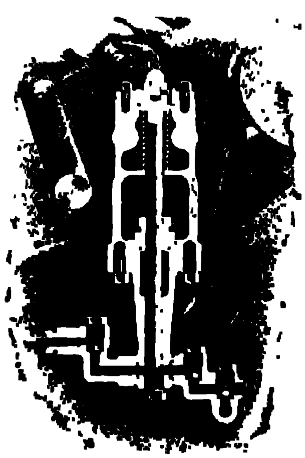


Illustration showing design of Fuel Pump.

Spraymaker.—In order to deal successfully with the various grades of heavy fuel oil, the combustion chamber is fitted with an improved patented type of spraymaker. At the correct time the fuel oil is rapidly forced through the spraymaker by means of the fuel oil pump operated from the sideshaft of the Engine. At the moment the fuel oil has to enter the combustion chamber it raises a small piston and valve in the spraymaker against a strong spring, which then allows the fuel oil to pass through a pulveriser, which, having a number of fine tangential grooves, gives to the oil a rapid whirling motion, thus splitting it up into a fine spray or mist, enabling it to mix thoroughly with the compressed air and ensuring complete combustion upon ignition.

The nipple of the spraymaker is of a particular construction (covered by patent), which prevents oil drip and accumulation of deposit, when heavy low grade fuel oils are used.

Tangye's Heavy-Oil Engine.

General Description.

Oil Regulation.—The quantity of fuel oil injected through the spraymaker is in proportion to the load on the Engine, the fuel oil being delivered by means of a pump operated by a cam on the sideshaft through a variable operating gear; this gear is connected to and operated by the governor, and varies the stroke of the pump and therefore the amount of oil delivered to the combustion chamber in proportion to the load on the Engine.

Fuel Oil Tank.—A main fuel oil tank is supplied in the upper portion of which is provided a filtering vessel.

Starting Oil Tank.—A smaller tank is also provided for containing Refined Petroleum for starting the Engine. This tank also serves for the supply of the Refined Petroleum to the ignition spraymaker when the Engine is arranged for the use of Tar and similar fuel oils.

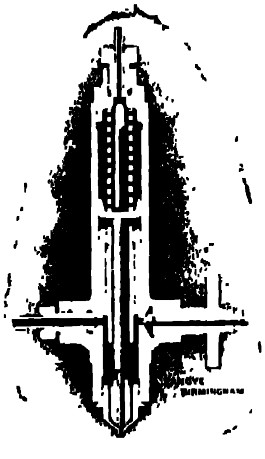


Illustration of Spraymaker.

Combined Fuel Heater and Filter.—This forms a heating apparatus which is kept at a suitable temperature by allowing a portion of the exhaust gases to pass through a jacket, which surrounds the same, for the purpose of warming and rendering more fluid the thick or heavy oils, or even the lighter oils in very cold weather or climates—which would not otherwise pass freely through the oil pump and spraymaker. This enables different grades of fuel oil to be used with greater satisfaction, as it ensures a good spray in the combustion chamber. A suitable regulator is provided for varying the temperature of the fuel oil heater.

The above also forms a filtering apparatus, and is provided with a number of filtering trays which are capable of being removed for cleaning purposes; thus ensuring that the fuel oil shall be free from dust or deposit before passing through the pump and spraymaker.

Automatic Ignition.—The ignition of the gaseous charges at all loads is effected automatically by means of the heat of compression, assisted by the heat of the walls of the combustion chamber and the internal heating sleeve, thus doing away with the use of all extraneous forms of ignition.

Governor and Speed Regulator.—The governor is of the revolving type, and is specially sensitive, giving great economy and steadiness under all conditions of working. It is fitted with a regulating arrangement enabling the speed of the Engine to be increased 2½ per cent. or decreased 5 per cent. from the normal while at work.

The governing is effected by controlling the quantity of fuel oil delivered to the combustion chamber at each cycle of the Engine, so that there is an impulse at every cycle, whether the Engine is working at full load or running light—in contradistinction to the "hit-and-miss" system of governing, in which the number of explosions or "cut-outs" depends upon the power the Engine is giving off.

Illustration showing Governor and Gear.

Tangye's Heavy-Oil Engine.

General Description.

Governing Capability.—The regular turning moment of an Engine depends, to a great extent, upon the ability of the governor to **control the sudden alterations of the load easily and quickly,** and thereby give the smallest difference in settled speed between full load and running "light." From this point of view the governor leaves nothing to be desired, as it has only to perform the light duty of moving a lever across the top of the pump plunger, thereby giving a greater or lesser travel to the fuel oil pumps.

By this system the governing is at once quick and energetic, so that when the load is suddenly increased or decreased in the Electric-lighting series to the extent of 25 per cent. of the normal power, the momentary variation does not exceed 2 per cent., while the settled difference of speed between full load and running " light " only amounts to about 4 per cent.

Lubrication.—The cylinder liner and piston, crosshead pin, crankpin, and exhaust valve spindle guide, are separately lubricated from a "sight-feed" mechanically operated central pressure feed lubricator, and on the **92 B.H.P.** and larger sizes Single Cylinder Engines, and **184 B.H.P.** and larger sizes Coupled Engines, the lubricator delivers the oil to three different points of the cylinder liner and piston.

The oil feed from the central lubricator to the crankpin takes place through the medium of an accelerating ring, which finally delivers the oil to the bearing by centrifugal action.

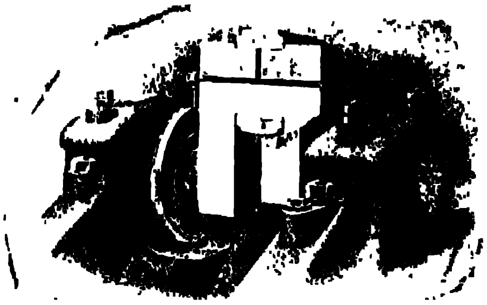


Illustration showing method of lubricating Crankpin.

The crankshaft and sideshaft bearings are provided with continuous ring lubrication, the various pins, rollers, etc., being lubricated in the usual manner. [illegible] lip [illegible] cast round the Engine bed to collect any waste oil

Cylinder Waste Oil Blow-off Valve.—The **92 B.H.P.** Single Cylinder and **184 B.H.P.** coupled and larger sizes are provided with a blow-off valve which permits the ejection of any oil which may have accumulated behind the piston

The above sizes are also fitted with a water cooled exhaust valve.

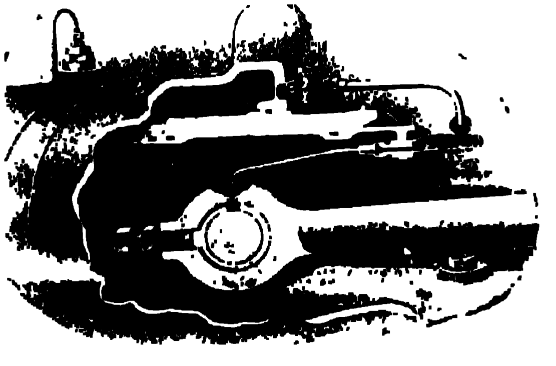


Illustration showing details of Oiling Arrangement to Crosshead Pin.

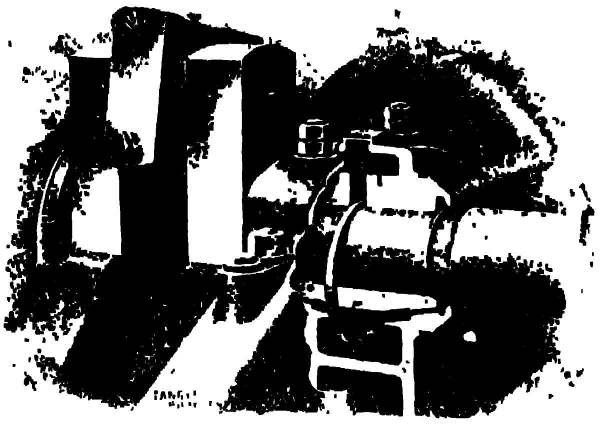


Illustration showing design of Main Bearings and method of lubricating same.

Fuel Oil Consumption.—From the results of tests given in table on a later page it will be seen that with an Engine under test at our works, using Residual Fuel Oil, a consumption of .42 pound per B.H.P. per hour, which is equal to .38 pint, has been obtained, and with Kerosene ·41 pound per B.H.P. per hour.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Heavy-Oil Engine.

General Description.

Tar Oils and Alcohol.—These Engines are capable of using Tar, Alcohol and similar oils in a satisfactory and economical manner, and when so required, an additional pump and patented ignition oil spraymaker are fitted.

Accessories.—With each Engine is supplied:—

Main fuel oil supply tank.
Starting oil supply tank.
Combined fuel oil heater and filter
Copper connections between fuel oil heater and pump.
Cast-iron exhaust chamber
A small blow lamp for **hand** starting when no compressed air is available.
Cleaning tools.
Set of spanners.
Foundation plan, with full instructions as to fixing.
One spare piston ring.
Oil pump packing.
An assortment of spare springs.
With Coupled Engines two sets of spare parts are supplied, but only one blow lamp.

Materials and Workmanship.—All materials used in the manufacture of Tangye's Heavy-Oil Engines are of best quality only, and first-class workmanship is employed in their construction, erection and testing.

Painting.—The Engine is carefully painted in a first-class manner with enamel paint.

Spare Part Service.

Realising that the success of any make of Oil or Gas Engine working under the conditions applying in India is very largely dependent on the prompt supply of spare parts when required, we have always maintained a large stock of all usual wearing parts likely to be needed after an engine has been in service for a number of years. Our buyers will realise that with several designs of engines, each having over 300 separate parts and with some 26 sizes of each, the provision of a spare part service is no small undertaking and involves a considerable lock up of capital Owing to simultaneous demands on particular parts we occasionally have to keep buyers awaiting the arrival of new stock and we therefore suggest that in all cases where heavy loss is likely to occur if an engine is temporarily stopped that the user should keep a nucleus reserve of spares himself. The following is suggested as a useful set in such cases:—

One spare air inlet valve.
One spare exhaust valve.
One spare oil sprayer complete.
One set of piston rings.
One connecting rod big end.
One fuel oil pipe and unions connecting oil pumps to sprayer.
One pump plunger.
One swivel block.

The following may also be added:—

One half-set of main bearings.
One pair of outboard bearings.

It is a sound policy to maintain a small stock of spares in the engines room and replace such parts when taken into commission.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Summary of Tests

in connection with a

Tangye's Heavy-Oil Engine.

Cold-Starting Type.

Kind of Fuel.	B.H.P.	Oil per B.H.P. per hour pounds	British Heat Units per B.H.P. per hour	Thermal Efficiency on the B.H.P.
KEROSENE having a heat value of 18,656 B.T.U.'s per lb.	40·74 32·10 20·59 10·53 0	·417 **·415** ·467 ·611 3·77 lbs. per hour.	7779 7742 8712 11398	32·71 **32·87** 29·21 22·32
RESIDUAL OIL having a heat value of 17,789 B.T.U.'s per lb.	40·92 32·32 20·75 10·54 0	·433 **·427** ·481 ·636 3·88 lbs. per hour.	7702 7595 8556 11313	33·04 **33·50** 29·71 22·49
TAR OIL having a heat value of 15,947 B.T.U.'s per lb.	40·77 31·11 20·68 10·53 0	·499* **·482*** ·534* ·702 4·18* lbs. per hour.	8054† 7805† 8685† 11159†	31·59 **32·60** 29·30 22·20

*As tar oil requires a very high compression to bring about ignition, Kerosene is made use of for this purpose. The amount of Kerosene used is very small and only amounts to about 5% of the total fuel consumed. This 5% of Kerosene is included in the quantities indicated.

†These figures include the heat value of the Kerosene used for igniting the tar oil.

The consumption of .427 lb per B.H.P. per hour with Residual Fuel Oil given in the table, expressed according to the standard heat value of fuel oil of 18,000 B.Th.U.'s per lb. represents the following:—

.422 pound per Brake Horse-Power per hour.

.380 pint per Brake Horse-Power per hour.

.319 pint per Indicated Horse-Power per hour.

From the table it will be seen that the extraordinary low fuel consumption of .415 lb of Kerosene per B.H.P. per hour has been attained and which, so far as published test results are known, constitutes a record, with such a small size Engine of the solid fuel oil-injection type.

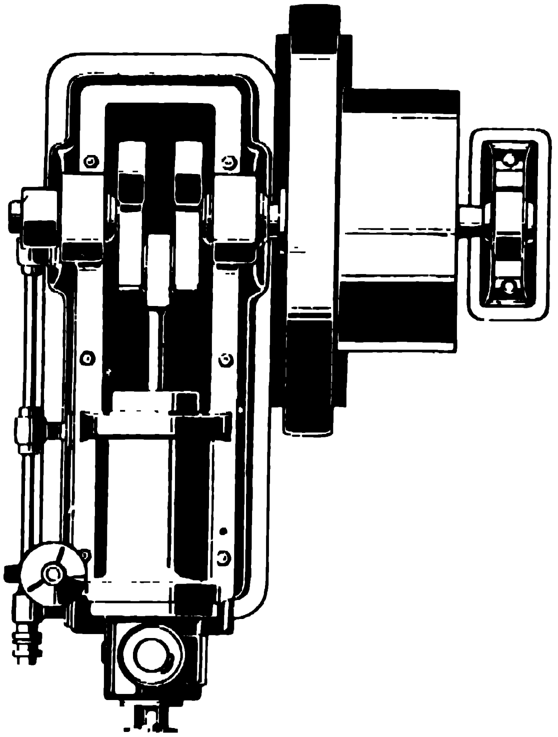
The thermal efficiency of 33.50 obtained on the B.H.P. when using Residual Fuel Oil is a most exceptional one, indicating the very high standard reached in the design and manufacture of this Engine.

From the foregoing it will be readily seen that the Engine will satisfy all requirements for high fuel oil economy and thermal efficiency, that it possesses practically all the essential features of the Diesel Engine, without recourse to very high compression, or the application of compressed air for injecting the fuel oil, and is constructed with the simplicity of an ordinary type liquid fuel engine.

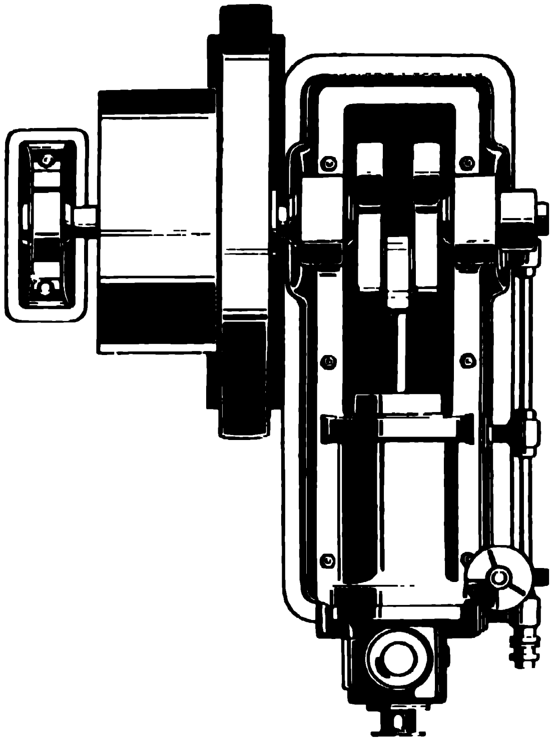
To those interested we shall be pleased to send a fully detailed report of a trial carried out on a 70-B.H.P. Tangye Heavy-Oil Engine by the well-known authority, Mr. T. A. Tookey, during which remarkable results were obtained.

Tangye's Heavy-Oil Engine.

Left and Right Hand Engines explained.



Plan showing Standard Left-Hand Engine.



Plan showing Standard Right-Hand Engine.

Single-Cylinder Engines.—The Single-cylinder Engine (with the exception of the **18 B.H.P.** and **22 B.H.P.** sizes) can be supplied either "right-hand" or "left-hand," as may be preferred to suit the position in which it is to be fixed, and care should be taken when enquiring and ordering to specify the "hand" required. In the absence of instructions to the contrary, the "right-hand" Engine will be supplied.

The **18** and **22 B.H.P. Engines** can be supplied with the drive on either side of the engine but with the sideshaft and valvegear "right-hand."

A reference to the plans above will enable buyers to decide whether a left or right-hand Engine will be better suited to their requirements.

The "left-hand" Engine, viewed from the cylinder end, has the sideshaft and valve gear on the left hand side of the Engine bedplate, and the drive on the right, as shown above.

Most makers standardise on a "right-hand" Engine and only alter the crankshaft when the opposite hand drive is required This leaves the sideshaft, governor and valvegear alongside the flywheel and is less convenient for operating the engine.

Coupled Engines.—The Coupled Engine consists of one "right-hand" and one "left-hand" cylinder and bedplate, with crankshaft carrying the flywheel. The **18 B.H.P.** and **22 B.H.P.** sizes are not offered as Coupled Engines.

Tangye's Heavy-Oil Engine.

Cold-Starting Type.

(*Fully protected by Patents.*)

The Single-Cylinder Engines are supplied in two series as tabulated below:—

Test Power.*		'Revolutions per minute.	Flywheel.	Driving Pulley ‡	Approximate Weight, Complete.	Overall Dimensions.	Prices, † Complete.
Brake H.P.	Indicated H.P.						
For General Purposes, such as driving workshop tools and similar machines; with single flywheel and outer bearing and soleplate.							
			ins.	ins.	cwts.	ins.	**Rs.**
18	21½	290	63 × 5½	20 × 9½	30	96 × 60	**5,740**
22	26½	285	66 × 6	24 × 11	37	105 × 63	**6,160**
25	30	280	66 × 6	27 × 11	48	110 × 64	**7,300**
30	36	265	69 × 6½	30 × 13	58	116 × 69	**7,900**
35	42	250	72 × 7	36 × 15	71	124 × 76	**9,430**
41	49	240	78 × 7¼	42 × 17	84	132 × 80	**10,210**
47	56	230	84 × 7½	48 × 17½	105	142 × 85	**11,880**
55	66	220	90 × 8	51 × 19½	120	150 × 90	**12,850**
66	79	220	90 × 9	54 × 22	155	157 × 98	**14,630**
77	92	210	99 × 10	60 × 22	175	167 × 108	**16,800**
92	110	200	99 × 10½	66 × 26	230	183 × 114	**20,140**
105	126	195	108 × 9½	72 × 28	268	193 × 125	**23,220**
125	150	190	106 × 14½	- -	348	205 × 136	**26,350**
For Electric Lighting and similar work, with single flywheel and outer bearing and soleplate.							
			ins.		cwts.	ins.	**Rs.**
18	21½	290	69 × 6½	Special	to suit 40	99 × 60	**5,980**
22	26½	285	72 × 7	„	„ 50	108 × 63	**6,480**
25	30	280	75 × 7	„	„ 63	115 × 64	**7,835**
30	36	265	78 × 8	„	„ 79	121 × 69	**8,495**
35	42	250	84 × 9	„	„ 91	130 × 76	**10,075**
41	49	240	90 × 10	„	„ 109	138 × 83	**10,970**
47	56	230	96 × 10	„	„ 128	148 × 86	**12,760**
55	66	220	102 × 10	„	„ 150	156 × 91	**13,660**
66	79	220	102 × 11	„	„ 179	163 × 99	**15,470**
77	92	210	106 × 14¼	„	„ 220	172 × 106	**18,470**
92	110	200	108 × 16	„	„ 280	188 × 115	**22,040**
105	126	195	114 × 16	„	„ 343	196 × 127	**27,420**
125	150	190	114 × 18	„	„ 431	208 × 136	**31,450**

*The "**Test Powers**" given in this Catalogue are the maximum Horse-Powers at the standard speeds to which the respective Engines are tested at Cornwall Works, Birmingham, before despatch, and a Certificate of such Test will be furnished on application

Fuel Oil, having a calorific value of about 18,000 B.T.U.'s per pound and up to .95 specific gravity, is used for developing the above powers.

The margin to be allowed between the **Test Power** and the **Working Power** depends upon the nature of the work to be done, and we shall be pleased to advise on receipt of full particulars of the duty

† Prices include foundation bolts, pipes, water cooling arrangements and driving pulleys. With engines of 35 B.H.P. and above, mechanical coolers are included.

‡ **Driving Pulley** is not supplied, unless specially ordered at an extra charge, but space is provided on the shaft between the flywheel and the outer bearing for a pulley of sufficient size to transmit the full power of the Engine. In the **Engines for General Purposes,** the pulley is of double width, while in the **Electric Lighting Series** the pulley is of single width. Standard Pulleys do not suit all drives and it is advisable to consult us before ordering.

Cooling arrangements.—The most suitable arrangement for cooling the circulating water depends on the local conditions of each particular case. For small engines water cooling tanks may be used; for larger engines Mechanically Water Coolers or circulating pumps and cooling towers are generally better. We shall be pleased to advise buyers on learning the local conditions.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Coupled Heavy-Oil Engine.

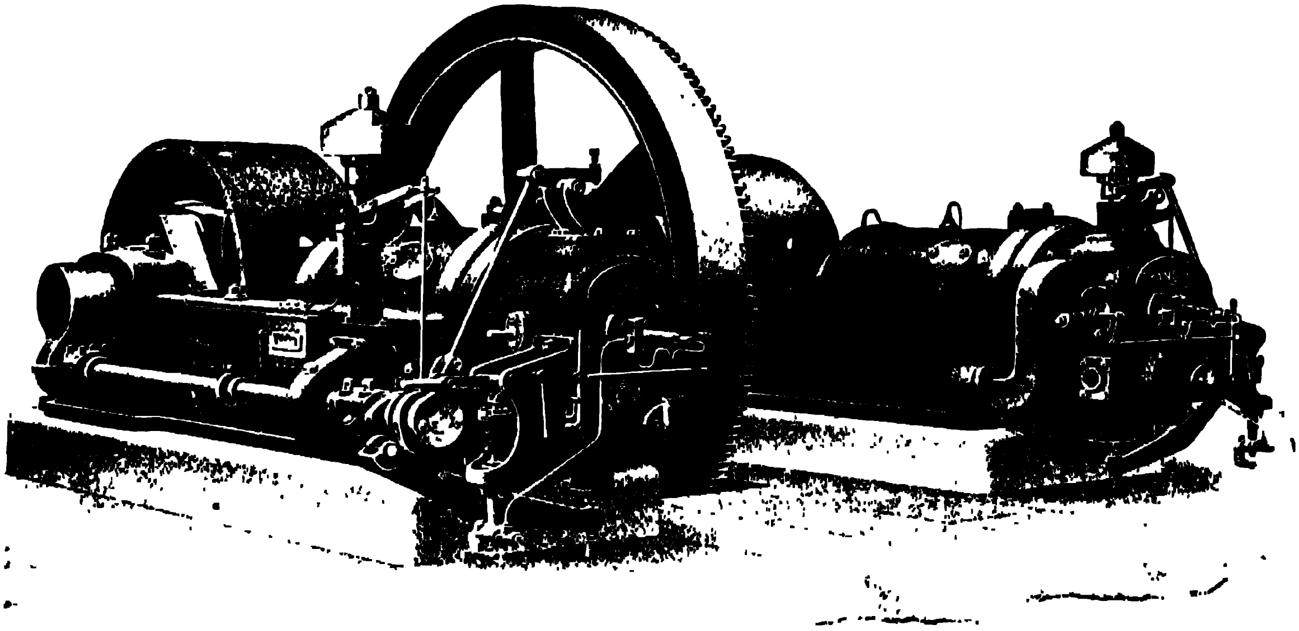


Illustration of the Coupled Engine for General Purposes.
Representing sizes 94 B.H.P. to 154 B.H.P.

The Standard Coupled Engine consists of one "right-hand" and one "left hand" cylinder and bed, with fittings as for the Single-Cylinder Engine, with one crankshaft swelled in the centre to take the flywheel

The sideshaft gears, etc., of the Standard Coupled Engine are placed outside the Engine beds, as shown in the above illustration, and this is the arrangement recommended. In special cases, to meet some particular requirement, the sideshaft gears may be arranged inside the Engine beds

For General Purposes.

Test Power		Revolutions per minute.	Flywheel.	Approximate Weight, Complete.	Overall Dimensions.	Price, Without Pulley.
Brake H.P.	Indicated H.P.					
			ins.	cwts	ins	
50	60	280	69×5	85	112×95	Rs 14,380
60	72	265	72×5¾	100	118×100	„ 15,480
70	84	250	78×6½	120	127×110	„ 17,700
82	98	240	84×7	143	135×115	„ 19,100
94	112	230	90×7½	183	145×130	„ 22,230
110	132	220	96×8	206	153×134	„ 24,260
132	158	220	99×8½	265	162×148	„ 27,230
154	184	210	102×10	305	169×158	„ 29,840
184	220	200	108×9½	399	182×169	„ 34,820
210	252	195	108×16	488	188×180	„ 40,120
250	300	190	114×16	634	206×200	„ 50,180

Prices.—The above prices include Engine with foundation bolts, piping to our standard arrangement and Mechanical Water Coolers for all sizes up to and including 154 B.H.P. For larger sizes cooling arrangement are not included.

Electric Lighting and Larger Engines.—The above coupled engines can also be offered fitted with specially heavy flywheels to give the close regulation necessary for Electric Lighting work.

Engines up to 500 B.H.P. can be quoted for having four cylinders arranged in pairs, two on each side of the flywheel.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Heavy-Oil Engine.

Cold-Starting Type.

(Fully protected by Patents.)

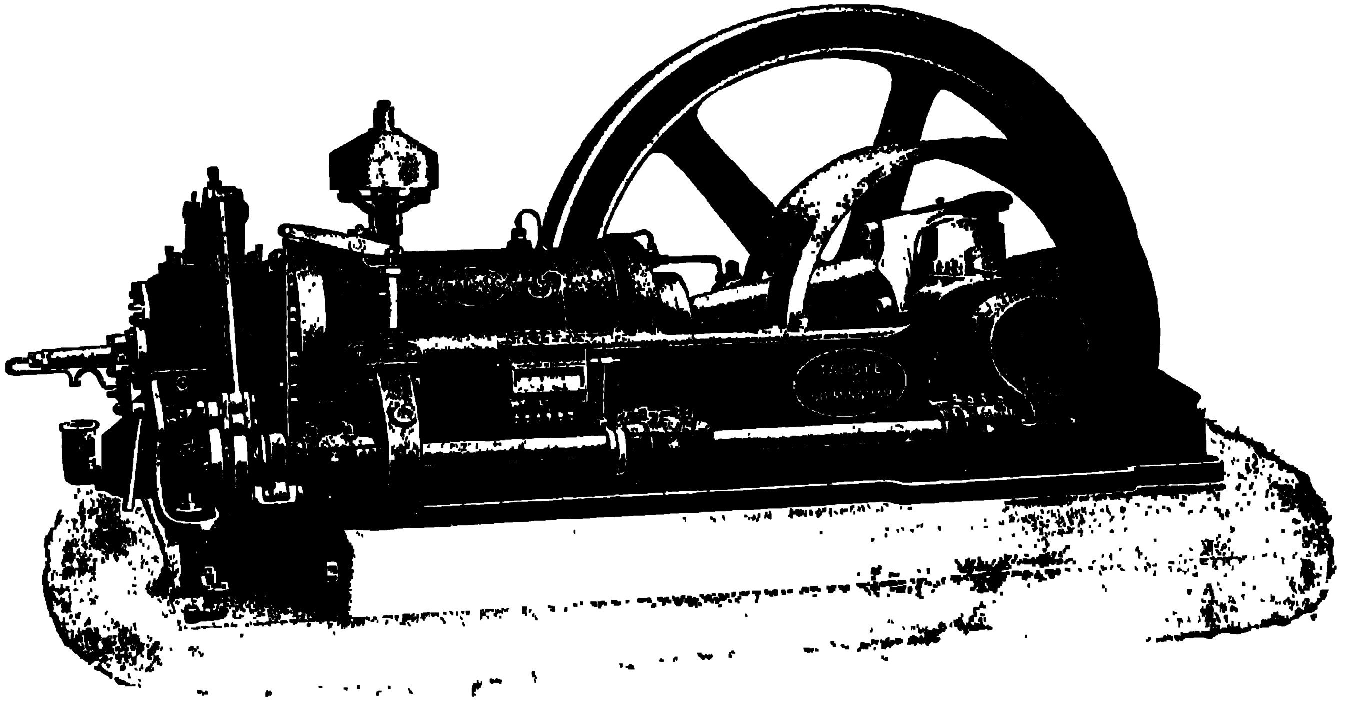


Illustration of the 92 B.H.P. to 125 B.H.P. Sizes, Right Hand, for General Purposes.

The following Patents are exclusive to the Tangye Engine.

Patent Combustion Chamber Sheath, which enables fuel oil containing a high percentage of asphaltum or bitumen to be used.

Patent Spraymaker Arrangement for dealing with low grade heavy fuel oils.

Patent Spraymaker Nozzle for preventing drip and deposit.

Patent Adjustable and Removable Emergency Ignition Plug, enabling Engine to be started by hand when no compressed air is available.

Patent Starting Mechanism for facilitating the easy starting of the Engine by one attendant.

Patent Ignition Oil Spraymaker, which enables Tar and similar fuel oils to be used.

Patent Super-compression Starter, advantageous when liquid and gaseous fuels are to be used, or when Engine has to work at very high altitudes.

Lubricating Oil. The selection of a suitable oil for lubricating the engine is of great importance as more oil engine troubles originate from the use of unsuitable oil than from any other cause.

To withstand the high cylinder temperature special oils are necessary. Oils which may otherwise be good but which become sticky or carbonise at high temperatures will clog the valves and piston rings and cause excessive wear, if no more serious trouble results.

To meet the requirements of buyers of our engines we carry a stock of Tangye's Special Gas Engine Oil which is supplied in two different grades, *viz.*, a light oil for engines up to and including the 66 B.H.P. size and a heavy oil for the larger sizes. This oil has the following essential properties:—(1) Exceptionally high flash point which ensures safety at all working temperatures; (2) High evaporating point which prevents waste and danger of dry "Cylinders"; (3) Freedom from injurious acids; (4) Freedom from tendency to gum; (5) Freedom from liability to produce cinder or other deposits in cylinders and other parts.

We stock this in 5-gallon drums and 40-gallon casks.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Notes on Selecting a Heavy-Oil Engine.

The following notes should be carefully considered when enquiring for, or ordering, a Heavy-Oil Engine:—

Test Power.—The **"Test Powers"** given in this Catalogue are the maximum Horse-Powers at the standard speeds to which the respective Engines are tested at the maker's Works, Birmingham, before despatch, and a Certificate of such Test will be furnished on application.

Working Margin.—To ensure a suitable reserve of power due allowance should be made between the Brake Horse-Power specified in the tables and the regular working load which the Engine is usually required to meet. This is very important in every case where an Engine has to work for many hours on a constant load, such as driving a pump, dynamo, etc. Intending customers are also strongly recommended to select an Engine having ample power, so as to cope with any sudden load, and to allow for the wide variations in fuel oils, etc.

We shall always be pleased to advise any intending purchaser as to the most suitable Engine for the purpose required, on receipt of full particulars of the work to be done and the conditions under which the Engine has to work.

Testing.—Every Engine is thoroughly tested before leaving the Works. During the preliminary stages of this test the Engine is run at various powers between "no load" and "full load," to ensure that the various parts are properly adjusted and that the Engine is satisfactory in every way for its regular daily working load. This testing period lasts from two to fourteen days or even longer, depending upon the size of the Engine. The Engine is finally run at the **Test Power,** and the Certificate given by us refers to the performance of the Engine under this final test.

Witnessing Test.—Customers, or their appointed representatives, may be present at the final test, provided that an agreed time is arranged beforehand.

Heat Value of Fuel.—Fuel Oil having a calorific value of about 18,000 B.Th.U.'s per pound and up to 0.95 specific gravity is used for developing the "Test Powers" given in the various tables in this catalogue.

Arrangements can be made for testing a buyer's engine on any special class of liquid fuel if a sufficient quantity is provided by the buyer for the purpose.

Height Above Sea Level.—A Heavy-Oil Engine gives off less power as its position is elevated. Roughly speaking, the loss of power may be taken at about **three per cent.** for each thousand feet above sea level.

Temperature of Air.—Where the temperature of the air supply is above 75° F., a reduction of 1 per cent. in the power of the Engine must be reckoned upon for each 5° F rise in temperature.

Some Electric Lighting and Power Plants driven by Tangye's Oil Engines.

For Military Works

Wireless Station, Allahabad
Station Hospital, Lahore
" " Rawalpindi
" " Lucknow
British Infantry Barracks, Lahore
Agra Club, U.P.

Indian States

Alwar State
Darbhanga Raj
Jhind State
American Mission, Bassein
" " Balasore
" " Allahabad

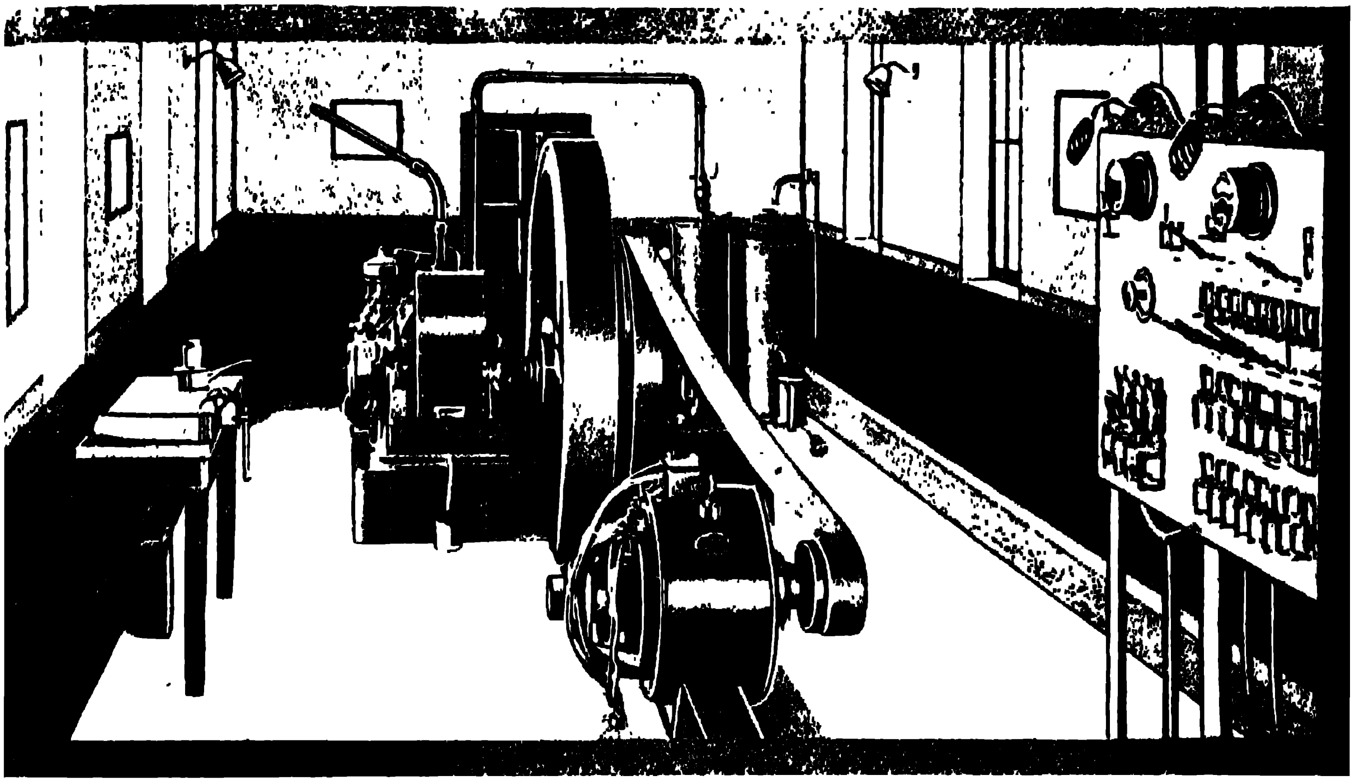
and numerous smaller plants.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Typical Installations Working in India.



What Users say :

We have to acknowledge receipt of your letter Z/I B F, dated 30th September, 1921, and have much pleasure in testifying to the efficiency of the 30 B.H.P. Tangye's Crude Oil Engine installed by you in 1915 The Engine has been in continuous use since then and has given every satisfaction. This, we believe, is in no small measure due to the excellent spare part service available Indeed we can recall no occasion on which our requirements in this respect have not been promptly and satisfactorily met.

Extremely simple to operate as well as economical to run, we can confidently recommend the Tangye Crude Oil Engine as peculiarly suited to Indian conditions

* * * * * *

A buyer who has had about 100 Tangye's "AA" type Oil Engines during the past eight years, writes as follows:--

"I am extremely pleased with the Tangye's "AA" type Oil Engine you have supplied in the past. The Engine is so simple to run that I find any intelligent coolie can be taught to run one in a week or two. From my point of view simplicity is everything as I put down most of the Engines in country districts, but the Engine also compares very favourably with other makes from the point of view of good and strong design and economical running Altogether I am quite satisfied with my purchases the best proof of this being the fact that I constantly give repeat order, in fact I am now confining my purchases to the one make of Engine"

* * * * * *

"It gives so much pleasure to write and tell you that I am greatly satisfied with the 70 B.H.P. Tangye's Semi-Diesel Crude Oil Engine which you supplied to me in October, 1915 The Engine drives 16 Cotton Ginning Machines In 1915 the Ginning season lasted five months and I worked the Engine day and night for the first three months without stopping one single minute. After six hours to clean up she completed the season without another stop."

* * * * * *

"In 1916 the season lasted nine months and I stopped for six hours once every three months for cleaning. My Engine is attended only by two Burman Oil men on salaries Rs 18 and Rs. 20 monthly."

* * * * * *

"We have great pleasure to inform you that we have been working the 10 H.P. Tangye's Oil Engine in our Cycle and Motor Works, since last twelve years, and it is still giving us entire satisfaction."

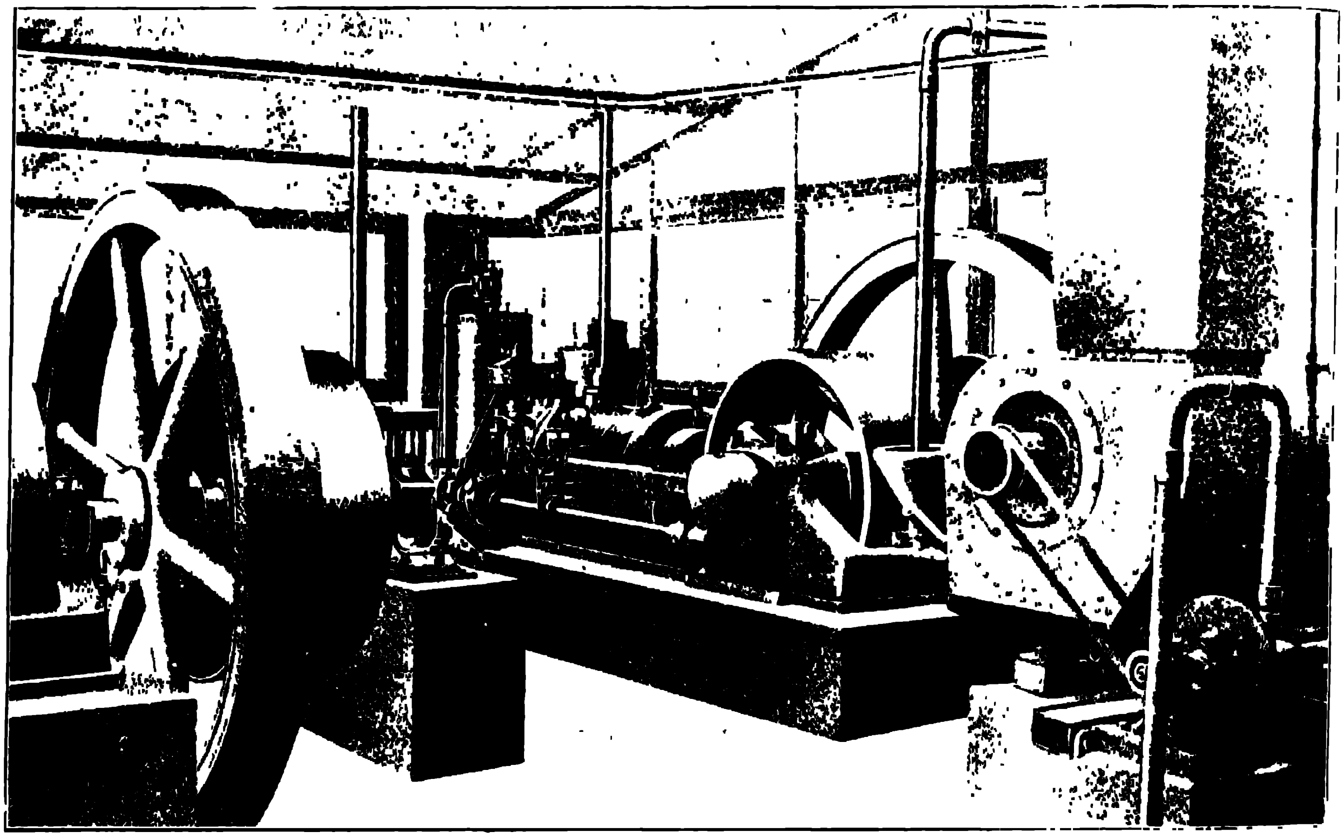
We shall be pleased to show the originals of the above and many other testimonials to any one interested.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Oil Engines on Tea Estates.



We illustrate above an installation on an Assam Tea Garden.

Tea Estates Using Tangye's Oil Engines.

Engines in Assam.	Horse-Power
Budla Beta Tea Company.	
Kharjan Division (Two Engines)	55 & 70
Bokpara Division (Two Engines)	55 & 70
Do (Two Engines)	55 & 105
Do. (for Electric Lighting) (Two)	18's
Jokai Company.	
Bokel Tea Estate	70
Bordeobam Tea Estate	70
Dikom Tea Estate	100
Hatiali Tea Estate .. .	60
Hukanpukri Tea Estate ..	60
Lengrai Tea Estate	42
Panitola Tea Estate	100
Pathalipam Tea Estate	70

Jhanzie Tea Association.	Horse-Power.
Borsillah (Two Engines) ..	70's
Seleng Tea Estate (Two Engines)	50's
Dr. O'Brian's Tea Company.	
Beheating Tea Estate (Two Engines)	19 & 42
Jorhat Company.	
Katonibari Tea Estate	42
Amluckie Tea Estate	85
Deepling Tea Estate	70
Halmirah Tea Co.	35
Lakwah Tea Estate	19 & Two 24
Titabur Tea Estate	41 & 35
Bishnauth Company.	
Boringajuli Tea Estate .	66
Dickerai Tea Estate ..	132
Dutflaghur Tea Estate ..	66

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tea Estates Using Tangye's Oil Engines.

Engines in Assam—(Concld.)

Bishnauth Company.	Horse-Power.
Paneery Tea Estate	66
Parbhoi Tea Estate	66
Aroa Tea Estate	19
Balipara Tea Estate	41
Borelli Tea Co (Two Engines)	60's
Bormah Jan Tea Estate	42
Bhooteachang Tea Estate (Two)	55's
Bindukuri Tea Estate (Three)	30's & 66
Nilpur Tea Estate	25
Silonibari Tea Estate (Two Engines)	60 & 70
Dalhousie Tea Estate	41
Dhunseri Tea Estate	24
Halem Tea Estate	50 & 55
Lamabari Tea Estate	35
National Tea Co	41
Singlo Tea Co.	7
Salonah Tea Co. (Two Engines)	66's
Tamulbari Tea Estate	36

Engines in Darjeeling District.

Arya Tea Estate	13
British Darjeeling Tea Co.	30
Darjeeling Himalayan Tea Co	30
Gielle Tea Estate	33
Hopetown Tea Estate	19

Engines in Darjeeling District -(Concld.)

	Horse-Power.
Kalej Valley Tea Estate	85
Kyel and Marybong Tea Co	24
Mahalderam Tea Estate	13
Nagri Farm Tea Co.	50
Selimbong Tea Estate	19
Tukvar Tea Estate (Two Engines)	41's

Engines in Cachar, Sylhet, Dooars, etc.

Ambiok Tea Estate	19
Amo	42
Bundookmara (Vernapur)	41
Buxa Dooars	16
Central Dooars Tea Co. (Two)	41's
Cheerie Valley Tea Estate	60
Dima Tea Estate	19
Doologram Tea Estate	41
Dwarband Tea Estate	42
Hussainabad Tea Co.	41
Iringmara Tea Estate	41
Merry View Tea	41
Oodlabari Tea Estate	60
Rajah Alli Tea Estate	42
Ranicherra Tea Estate	66
Roopacherra Tea Estate	55
Rungicherra Tea Estate	42
Ruttonpur Tea Co. (Two Engines)	25 & 35

The Agents for a number of Tea Gardens write:—Further to our interview of date the Manager advises this Engine has been standing up to the load in his factory well during the past season As this load would appear to be a big one for the Engine as follows:—

350 ft. Shafting, 14 Rolling Tables (Rapids), 7 Green Leaf Sifters, 48 ins. Blackman Fan, 3 Moore's Sorting Machines, 4 Tea Breakers, 1 Triplex Packing Machine, 2 6 ft E C P. Tea Driers, 1 6 ft. Empire Drier, 1 Paragon 4 ft. Drier, 1 Empress 4 ft Drier and Workshop

We should be glad to have your opinion as to whether it might not be excessive. We would mention the oil consumption has been the lowest as calculated per maund output of tea (·45 gallons) of any garden we know.

[*Note.*—The above consumption was obtained on an old design of engine. With the new Heavy Oil Cold Starting Engines considerably better results are possible.]

Referring to the Cold Starting Heavy Oil Engine another buyer writes:—

"I may say that the engine has given no trouble at all and I am very pleased with its performance. It is running very sweetly and quietly."

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Quick-Change All-Fuel Heavy-Oil (or Gas) Engine.

(Patented.)

Awarded a Gold Medal at the Calcutta Exhibition, 1923-24.

For some years there has been considerable uncertainty whether a regular supply of a liquid fuel for motive power purposes will always be available, thus creating a demand for an Internal Combustion Engine capable of using all kinds of liquid fuel and also gaseous fuels without the necessity of making extensive alterations to the engine.

The advantage of being able to make use of either oil, wood, charcoal, coke, or waste products will be sufficiently apparent to users and is in itself a safeguard in the event of the price of liquid fuel becoming unduly high in years to come. It should be pointed out that provided that the all-fuel engine is ordered in the first instance it is not necessary to order the gas-producing plant until it is required if, as is assumed, oil fuel is to be used at the commencement. The extra expenditure is therefore limited to the interchangeable parts required for the engine. The All-Fuel Engine is specially recommended for use in factories where only a limited amount of waste products are available.

In 1912, Tangyes, Limited, sent an engine to the Baku Exhibition capable of using Crude Oil, Petroleum, etc., or Town-Gas, Suction-Gas or Natural-Gas, the change being made without stopping the engine.

To meet the demand to-day for an Internal Combustion Engine capable of using all kinds of fuel, a special apparatus has been designed enabling the Tangye Heavy-Oil Engine to be offered for liquid and gaseous fuels, the **change being made quickly** by a simple adjustment.

This interchangeability is made easier by the use of the Tangye Patented Super-compression Starting Apparatus, which **enables the change from liquid to gaseous fuels or *vice versa*, to be effected very quickly.** This starter dispenses with the necessity of changing the combustion chamber, piston and many other details on the engine, which is necessary in some makes of engines.

The All-Fuel Engine can be supplied in any of the following forms:—

1st. As a Standard Heavy-Oil Engine, as described in the preceding pages, arranged for alteration at a later date. This alteration would then involve a new piston, inlet valve box, starting valve and other small detail parts.

2nd. A Heavy-Oil Engine, but fitted with the necessary parts which will enable the alteration to be made later at a small expense. In this case the piston, inlet valve, super-compression starting valve and small details would be those necessary for using liquid or gaseous fuels. The special parts required when the alteration should ultimately be made being the magneto, the operating gear for same, the sparking plug and some small details.

3rd. A Quick-Change All-Fuel Heavy-Oil Engine, arranged with all accessories for using liquid or gaseous fuels.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Quick-Change All-Fuel Engine.

The arrangement consists of a Tangye Heavy-Oil Engine, cold-starting type, fitted with air and gas inlet valve and variable admission governing gear of the same design as used on the "T3" Type Gas Engine.

A Guillou-type magneto is fitted complete with sparking plug, maker's patent super-compression starting valve and operating gear, and a special piston, which is suitable for liquid or gaseous fuels.

The two views on this page show the combustion chamber ends when arranged for liquid fuel and gaseous fuel respectively.

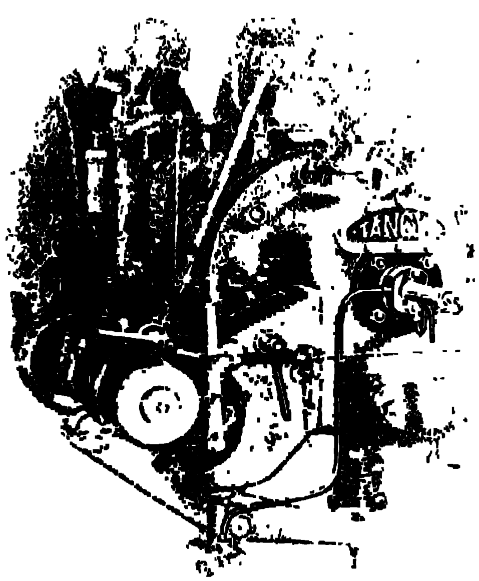


Illustration showing the parts fitted for Liquid Fuel which require changing when gaseous fuel is to be used.

Illustration showing the parts fitted for Gaseous Fuel which require changing when liquid fuel is to be used.

When the engine has to run on gaseous fuel, the air and gas inlet valve, variable-admission governing gear and the magneto gear are made use of, but the fuel oil pump is put out of action, a plate taken off the connecting rod and the sparking plug fixed in the place of the fuel oil sprayer.

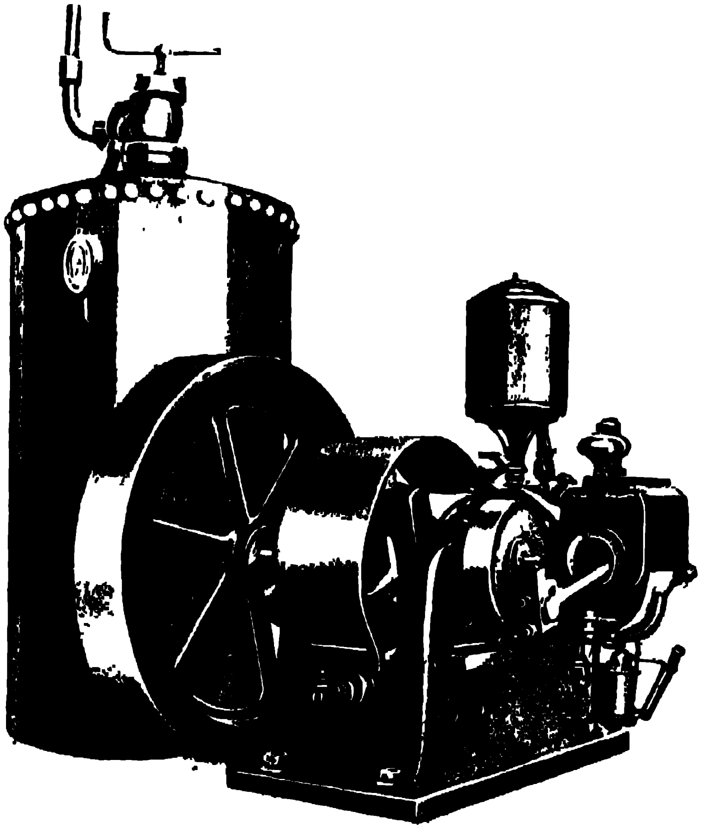
For running on oil fuels, the sparking plug is replaced by the fuel oil sprayer, the magneto put out of operation, a constant lift given to the air inlet valve, the fuel oil pump put into action, and a plate put between the end of connecting rod and crankpin bearings to raise the compression.

However, as this compression is much too low to enable the engine to be started from cold, use is made of the Tangye Patent Super-compression Mechanically-operated Starting Valve in order to raise the compression to the required pressure necessary during the process of starting the engine, which occupies, say, from 10 to 15 seconds. During this period the inside of the combustion chamber becomes slightly warmed, after which the super-compression starting valve is put out of operation; the combined heat of compression and the now warm combustion chamber being sufficient to bring about ignition of the gaseous charge

The above engine can be offered in all sizes (single cylinder or coupled engines) from 25 to 250 B H.P.

Prices on application.

Tangye's Air Receiver Charging Pumps.



Our illustration shows a compact self-contained charging set comprising a 2¾ H.P Tangye's "AA" Type Oil Engine as described fully in subsequent pages, direct coupled to a small water cooled Air Compressor attached to the frame of the engine and worked directly from the crankshaft The set is suitable for pumping up Air Receivers in large engine installations to a pressure of 250 lbs. per square inch and this pressure can be raised in about 20 or 25 minutes after starting up the engine.

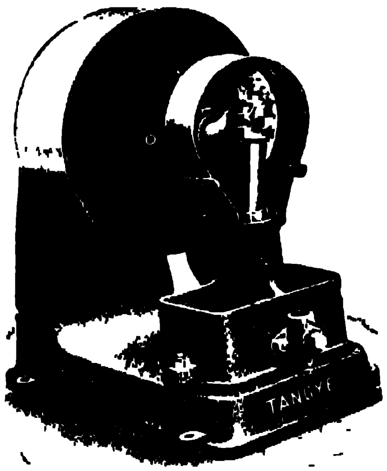
The Engine works on kerosene and is the usual lamp starting type which requires about 8 or 10 minutes preliminary heating before starting. If desired a magneto starting attachment can be fitted at extra cost, but we do not recommend this, as we consider the addition of the magneto on an engine which is only occasionally used is a complication which is better avoided.

Tangye's Air Receiver Charging Pumps.

The utility of a small starting engine in conjunction with modern high pressure Cold Starting Crude Oil Engine will be appreciated by all who have experience with large Oil Engines. It occasionally happens that, through carelessness on the part of an engine driver, the air pressure for starting is dissipated and hand starting becomes necessary. With the Tangye starting engine described the tedious process of starting a large engine by hand is avoided and a saving of several hours may be effected in each case The value of time saved by having an auxiliary engine may easily pay for the initial outlay after the engine has been used on a few occasions.

Price of Engine with holding down bolts and plates exclusive of cooling arrangements.
. **Rs. 1,350-0**

Belt Driven Air Receiver Charging Pump.



In cases where a separate small engine is already available or where two engines are driving on the same shaft, we can offer a separate small Belt Driven Air Compressor as shown in the above illustration This is a substantial design with Ring Oiled Bearings.

Driving Pulley	16 ins. by 2½ ins.
Speed Recommended	350 R.P.M.
Power Required	2 B.H.-P.
Price, complete with holding down bolts	**Rs. 350-0**

The Four-Stroke *versus* the Two-Stroke Engine.

The Tangye's Oil Engines described in the foregoing pages operate on what is known as the "Otto" or four-stroke cycle, in which the piston receives an impulse once in every two revolutions of the engine crankshaft. During comparatively recent years what is known as the two-stroke engine—generally made in a vertical type—has been developed and extravagant claims have been made for it. Chief among these claims are the following:—

(1) The engine takes up less space.

(2) It is simpler in construction having ports instead of valves operated by cams.

(3) It is of an enclosed type and therefore more suitable for use in the open or in dusty situations.

(4) Claims are sometimes made on the score of low fuel consumption but—as far as we are aware—no claim has yet been made that the consumption is better than or even as low as that of a modern four stroke, such as the Tangye Engine

Our reply to the above claims is as follows:—

(1) **Space Required.**—As far as floor space is concerned, the vertical two-stroke engine has an advantage over the horizontal engine, but generally in India the limitation of space is not a serious matter—as on board ship for instance—and is not sufficient in itself to counterbalance other disadvantages.

(2) **Simpler Construction.**—This is practically limited to the elimination of mechanically worked valves and side shaft gear.

We claim that such efforts in the direction of simplicity cannot be attained without sacrifice of efficiency as is shown by the higher fuel consumption of the two stroke engine.

(3) **Enclosed Type Engine.**—Our experience goes to show that when engines have to be put in charge of comparatively unskilled *mistries*, an open type engine in which all working parts are visible (and can be felt if necessary) is the safer type to adopt. Such things as a hot bearing, or leaking piston rings are difficult to detect in an enclosed engine

The claim that an enclosed engine is dust-proof is more apparent than real, as with most two stroke engines the air for combustion has to be sucked in through the crank case; and further if there is a leak past the piston rings the air for combustion will be vitiated.

(4) **Low Consumption Claim.**—We make the statement that no authenticated tests have yet been made to date with any two-stroke engines to prove that their consumption is equal to or less than that of a modern four-stroke engine of the same power.

Further, provided that no radical alteration of two-stroke design is made after the publication of this list, we are prepared to supply a Tangye Engine, set it up, test it on load at the buyer's works and take it away again if we cannot do the same work with a lower fuel consumption than that of a two stroke engine of the same horse-power.

The following are the specific claims which we can make for the Tangye's Heavy-Oil Engines:—

(1) Elimination of vapouriser and blow lamp for starting up

(2) Ability to work on lower grades of fuel oils and with a slight modification—on cheap tar oils.

(3) Ability to be converted to a Suction Gas Engine at any time if originally ordered with this end in view.

(4) Complete accessibility No part of the largest engine made is out of reach of a man standing at floor level.

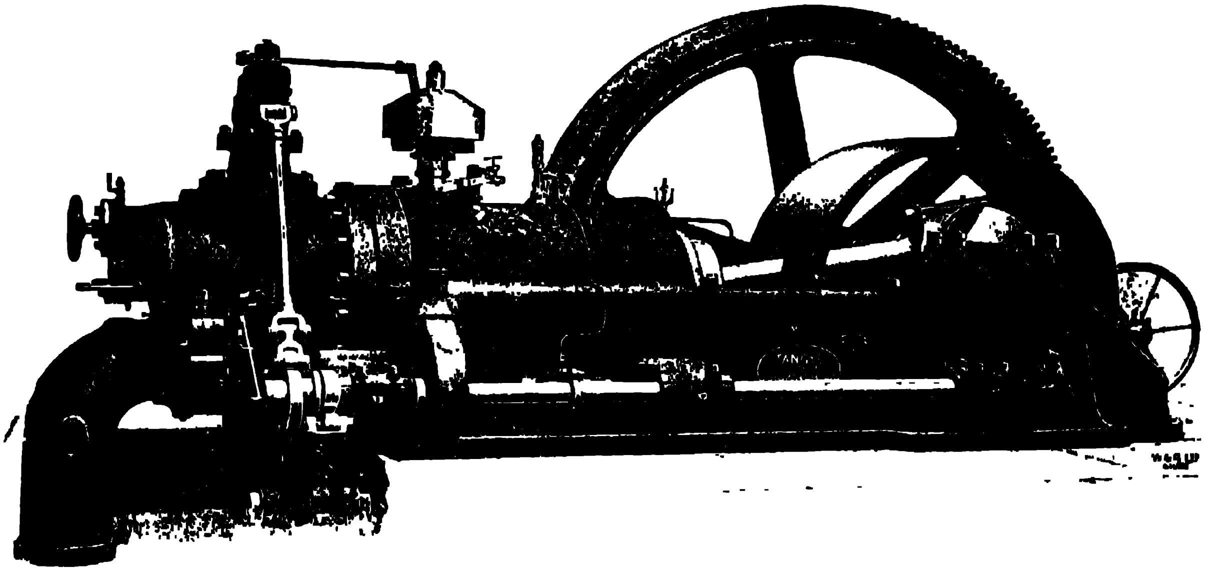
(5) Easy to dismantle and clean. Compare this with the two-stroke engine in which a new piston ring cannot be fitted or a connecting rod be removed without breaking the water joint at top of cylinder and drawing the complete piston and rod. Excepting in small engines, this usually necessitates using a crane or special lifting tackle.

(6) Low fuel consumption—see above and test on page 394.

(7) Low prime cost—Except in the smallest sizes of engines the four-stroke Tangye Engine is generally cheaper than the two-stroke design.

We shall be glad to deal more fully with any of the above or other points in which buyers may require any fuller particulars.

Tangye's Gas Engines and Suction Gas Producers.



Introduction.

The economy of the Gas Engine in conjunction with a suitable type of Gas Producer is such that it should always receive first consideration whenever, and wherever, suitable fuel is obtainable Gas Engines are designed for working either on Town Gas or on Suction Gas. In the former case no special gas producer is necessary; in the latter case a Gas Producer, worked by the suction of the engine hence the term "Suction Gas Producer"—has to be supplied, designed to suit the particular fuel to be used. When working on Producer Gas, the engine will develop about 15 to 20 per cent less power than on Town Gas The classes of fuel from which gas can be made are referred to in the pages which follow on the Suction Gas Producer

Tangye's Gas Engines are made in a large number of sizes up to 440 B.H.-P. A considerable number of these engines have been supplied to users in India, particularly in South India and Ceylon, where wood and waste products are more readily obtainable at a nominal cost. We can also show prospective buyers who may be visiting Calcutta a large Tangye's Waste Product Gas Plant which has been working in a local Factory for some years.

Notes on Selecting Gas Engines and Producers.

Suitable Fuels.

The following notes should be carefully considered when enquiring for, or ordering, a Gas Engine:—

Test Power.—The "Test Powers" given in this Catalogue are the maximum Horse Powers at the standard speeds to which the respective Engines are tested at the maker's Birmingham works, before despatch, and a Certificate of such Test will be furnished on application. Engine ratings are based on the power developed with Town Gas or Anthracites as fuel.

On these test powers a suitable margin should be allowed, depending on the class of work to be done and the kind of fuel to be used in the producer. If full particulars of work and fuel are sent to us we can advise buyers what is the size of the engine which should be installed. Deductions must be allowed for temperature and elevation as in the case of Oil Engines. (See Oil Engine Section.)

Testing.—The engines are submitted to the same lengthy tests as in the case of Heavy Oil Engines.

Gas Producers and Fuel.—Several types of Gas Producers (as described more particularly in succeeding pages) are made, and the type to use depends on the class of fuel or fuels available. The largest types of Producers are those designed for light fuels such as sawdust or light waste products and with these almost any other heavier fuel can be used if necessary. On the other hand the use of the smaller and cheaper producers which are designed for Anthracite, Gas Coke, or Charcoal is limited to the fuels for which they are designed.

Charcoal as Fuel.—Charcoal is the simplest fuel to work in a Suction Gas Producer and when obtainable at a moderate price it is economical to install suction gas plants of less than 20 B.H.-P. in preference to oil engines. Generally charcoal is not obtainable at a sufficiently low price to make it a profitable fuel to use, except in situations within a few miles of forest areas. For a moderate size of plant it may be taken that when charcoal costs Rs. 1-4 or less per maund it is well worth considering as a source of motive power. At the figure quoted its value for power purposes is the same as Crude Oil costing Rs. 60 per ton.

Indian Coke and Coal.—Indian Coke is generally too expensive to use as fuel. Coke at Re 1 per maund is equivalent to oil at Rs. 60 per ton.

In India there is practically no coal equivalent to Anthracite and almost all Indian coals are Bituminous with a high volatile content which results in caking in the producer. There are a few exceptions. Bikanir Coal, which is of poor quality for steam raising and is practically to be classed as lignite, is a suitable fuel for producer plants but the cost of carriage limits its use to certain areas.

Wood and Waste Products.—The commercial value of Suction Gas Producers lies in their suitability for using waste products such as wood blocks, chips, shavings and saw dust, paddy husk, spent tan, cocoanut shells, Elephant grass, tea prunings, etc. Producers of this type are larger and more expensive than those for charcoal and a properly designed cleaning apparatus and tar extractor is part of the equipment. We do not recommend a smaller producer of this type than one which would serve a 50 B.H.-P. Engine. They are particularly adaptable for industries producing waste material which is difficult and uneconomical to fire in steam boilers and for tea and other estates where the transport of fuel is a costly matter. Wood refuse when utilised in a Producer Plant will produce three to four times as much horse-power as can be produced by the same quantity of fuel when fired into a steam boiler.

Tangye's Gas Engine with Variable Admission Governing.

Abbreviated Description.

Design.—The construction of the Engine is substantial and well proportioned, and Tangye's Limited have introduced many improvements suggested by their extensive experience in the manufacture of Internal Combustion Engines, extending over a period of nearly half a century. The result is an up-to-date Engine, with increased efficiency and reliability, reduced fuel consumption, steady running, and a minimum of wear and tear.

The **Combustion Chamber** is a separate casting. The **inlet and outlet valves** are arranged one above the other so as to be **easily accessible,** and to enable the interior of the combustion chamber to be readily examined by the withdrawal of the inlet valve box.

Governing.—The governing is on the **"variable admission"** system with Tangye's patent **operating gear,** which controls **the quantity of the gaseous charge** admitted to the cylinder; there is, therefore, an impulse at every cycle of the Engine even when running without any load.

The charges are varied by altering the lift of the combined gas and air inlet valves, which, moving simultaneously and with the same amount of travel, maintain the **correct proportions of gas and air at all variations of the load,** thereby securing the greatest economy in fuel consumption.

By this system of governing the proper fuel consumption is attained not only with full load, but also with intermediate loads and when running "light"; even with the smallest charge the ignition is quite certain, and the regularity of running of the Engine absolutely satisfactory.

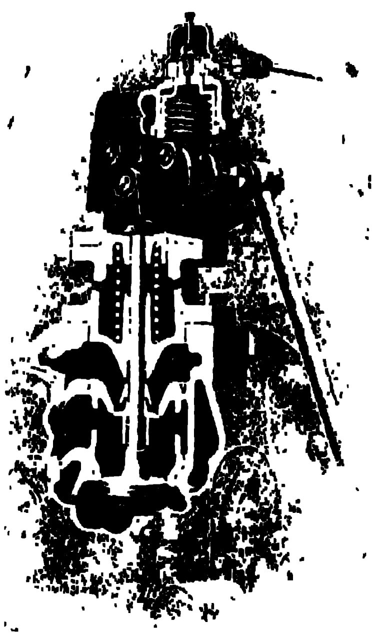


Illustration showing Section of "Variable Admission" Gear.

Starting.—A Compressed-Air Receiver is supplied for starting purposes with all sizes of the Single-Cylinder Engines (with the undernoted exceptions), and with all sizes of the Coupled Engines. The air receiver is fitted with pressure gauge and retaining valve—the Engine cylinder (each cylinder of the Coupled Engine) being provided [illegible] a combined charging and starting cock.

These starting arrangements can be supplied, at an extra charge, on the 46 B.H.-P. and smaller sizes of the Single-Cylinder Engines.

A "Town" Gas Engine for starting purposes with Air Compressor fixed on the side of bedplate, and with compressed-air receiver fitted with pressure gauge and retaining valve, is supplied with the Single-Cylinder Engines 190 B.H.-P. and larger sizes, and with the Coupled Engines 204 B.H.-P. and larger sizes (Town Gas B.H.-P. is quoted). If "Town" Gas is not available, a starting Engine to work with petroleum, benzoline or alcohol can be supplied at an extra charge.

Tangye's Gas Engine.

Abbreviated Description.

Barring Gear.—All sizes of the Coupled Engines are provided with barring gear, consisting of handwheel and pinion engaging with teeth cast in the flywheel. Barring gear is also included with the 116 B.H.-P. General Purposes and 91 B.H.-P. Electric Lighting and the larger Single-Cylinder Engines.

The ignition of the gaseous charge is effected by **low-tension magneto-electric** system, **the spark** being produced in the combustion chamber by means of a mechanically-operated "make and break" arrangement, with **variable timing device.**

The **sparking plug** is **Tangye's Patent,** enabling the internal sparking points to be cleaned while the Engine is at work; the so-called "fixed" electrode is carried in an insulated tube or sleeve, and is constantly revolved by the mechanically-operated gear provided for the purpose. This constant friction of the two internal contact surfaces removes any deposit which may prevent proper electrical contact.

Variable Timing Device.—A very desirable feature in any magneto-electric ignition gear is a **means for altering the position of the ignition point** in the crank path while **the Engine is running;** and when working with Producer Gas, such an arrangement is really requisite, as enabling the Engine to be worked satisfactorily at starting, at "light" as well as at heavy loads, with a resultant economy in fuel consumption. In the case of many Engines on the market, the ignition gear supplied is not capable of being altered while the Engine is running.

Governing. The governing is at once quick and energetic, so that when the load is suddenly increased or decreased in the Electric Lighting series to the extent of 25 per cent. of the normal power, the momentary variation does not exceed 2 per cent ; while the settled difference of speed between full load and running "light" only amounts to about 4 per cent.

Gas or Fuel Consumption.—"Town Gas." The consumption of standard coal gas of 650 British Thermal Units "gross" heat value (or 585 B.T.U. "net" heat value) per cubic foot, varies from 11 cubic feet per **Indicated** (or 13 cubic feet per **Brake**) horse power hour in the larger Engines, to 17 cubic feet per **Indicated** (or 20 cubic feet per **Brake**) horse-power hour in the smaller. When running "light," or with only part load, the total consumption is, of course, reduced. The consumption can be stated for any other quality of gas, if the heat value be given.

" Suction " Producer Gas. The consumption of fuel in Tangye's "Suction" Gas-Producer varies as follows:— With good quality charcoal from .70 lb. per **Brake** horse-power hour in the larger Engines to 1 lb per **Brake** horse-power hour in the smaller. With suitable gas coke, the consumption of fuel varies from 9 lbs. per **Brake** horse-power hour in the larger Engines to 1.25 lbs in the smaller. With wood or wood waste or refuse of suitable quality from 2 to 3¼ lbs per **Brake** horse power hour.

Illustration showing Self-Cleaning Sparking Plug.

Accessories.—Each Engine is provided with :—

A cast-iron exhaust chamber
Air silencer which is formed by the Engine bed
Cast-iron cased gas bag and anti-pulsator combined (with Engines for "Town" Gas).
A set of spanners
Foundation plan, with full instructions as to fixing and working

For a more quiet exhaust, we recommend a cast-iron terminal exhaust silencer being provided, and when required this item can be supplied at extra cost.

Right and Left Hand Engines.—Either Right or Left Hand Engines can be supplied as for the Heavy Oil Engines previously described. For illustrations of Right and Left Hand types see page 491.

For full description of Tangye's Gas Engines write for separate list.

Tangye's Single-Cylinder Gas Engines—T3 Type with "Variable Admission" Governing.

*Test B.H.-P. on		Revolutions per minute.	Flywheel	Approximate Weight, Complete.	Overall Dimensions	Price, with H.D. Bolts (for Suction Gas)
Town Gas.	Suction Gas.					
FOR GENERAL PURPOSES						
			ins.	cwts.	ins.	Rs.
25	21	280	66×6	43	110×66	5,690
31	27	265	69×6½	53	115×72	6,220
38	33	250	72×7	66	122×76	7,000
46	40	240	78×7¾	77	130×83	7,700
53	47	230	84×7½	98	138×90	9,400
64	56	220	90×8	114	147×95	10,400
75	66	220	90×9	147	153×102	12,135
91	80	210	99×10	167	162×112	13,550
102	92	200	99×10½	217	184×121	16,800
116	103	195	108×9½	250	194×130	19,270
138	123	190	106×14½	332	205×136	24,600
161	144	175	120×10½	364	219×146	29,360
190	170	170	120×15	486	232×144	38,400
225	200	170	114×18	550	232×150	46,200
245	216	160	129×16½	628	252×168	50,100
FOR ELECTRIC LIGHTING.						
			ins	cwts.	ins.	Rs.
25	21	280	75× 7	58	114× 66	6,140
31	27	265	78× 8	71	120× 72	6,830
38	33	250	84× 9	86	128× 76	7,680
46	40	240	90×10	102	136× 83	8,500
53	47	230	96×10	121	144× 90	10,375
64	56	220	102×10	138	153× 95	11,250
75	66	220	102×11	170	159×102	13,000
91	80	210	106×14½	210	166×112	15,300
102	92	200	108×16	266	189×121	18,800
116	103	195	114×16	318	197×130	23,680
138	123	190	114×18	418	208×136	30,000
161	144	175	120×20	479	219×146	35,000
190	170	170	120×22	614	232×158	45,300
225	200	170	126×25	715	235×164	52,700
245	216	160	129×26	820	252×184	59,400

*The "**Test Powers**" given in this Catalogue are the maximum Horse-Powers at the standard speeds to which the respective Engines are tested at the maker's works before despatch, and a Certificate of such Test will be furnished on application.

The margin to be allowed between the **Test Power** and the **Working Power** depends upon the nature of the work to be done, and the fuel used. We shall be pleased to advise on receipt of full particulars of the duty.

See Notes on Heavy Oil Engines.

Water Cooling Arrangements are not supplied unless specially ordered; for particulars of mechanical coolers see pages 532 to 536.

Driving Pulley is not supplied, unless specially ordered at an extra charge, but space is provided on the shaft between the flywheel and the outer bearing for a pulley of sufficient size to transmit the full power of the Engine. In the **Engines for General Purposes**, the pulley is of double width on the sizes 25 to 116 B.H.-P. and single width on the 138 to 245 B.H.-P. sizes: while in the **Electric Lighting series** the pulley is of single width in all the sizes.

SPECIAL NOTE.—Engines can be supplied either "Right Hand" or "Left Hand."

Unless otherwise stated a "Right Hand" Engine is always supplied.

Tangye's Single-Cylinder and Coupled Gas Engines—T3 Type.

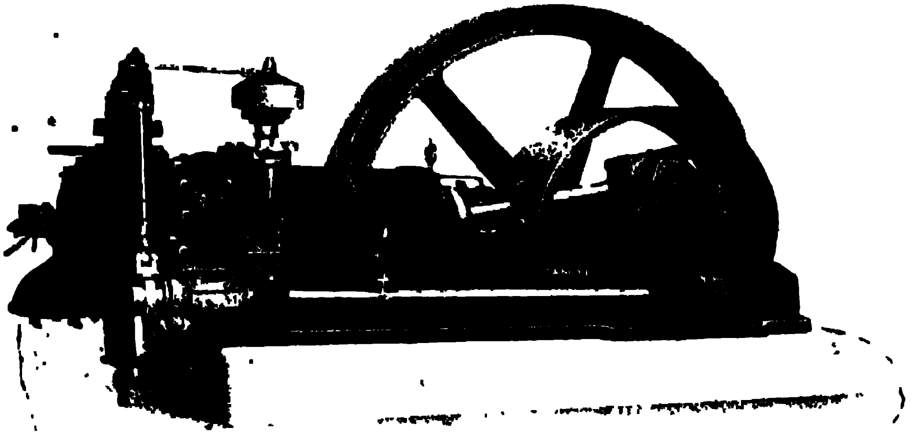


Illustration of Single-Cylinder Engine.

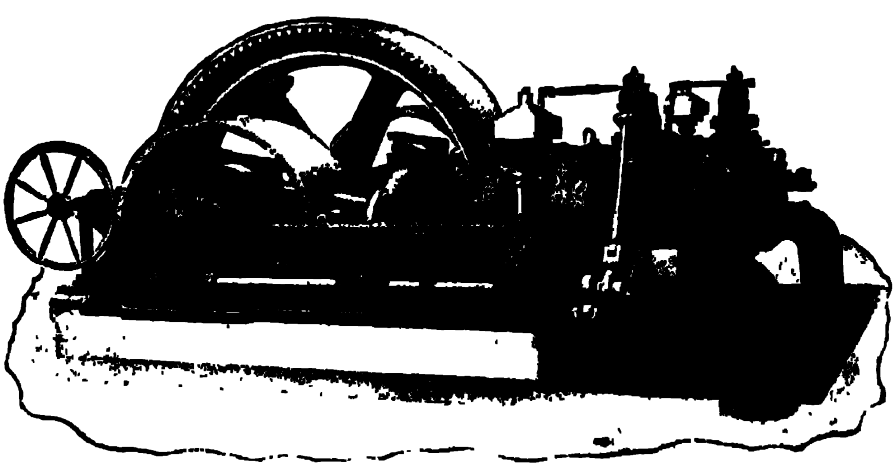


Illustration of Coupled Engine.

Tangye's Coupled Gas Engines—T3 Type

with "Variable Admission" Governing.

For General Purposes.

*Test B.H.-P. on Town Gas.	*Test B.H.-P. on Suction Gas.	Revolutions per minute.	Flywheel.	Approximate Weight, Complete.	Overall Dimensions	Price, with H.D. Bolts (for Suction Gas).
			ins.	cwt	ins.	Rs.
50	42	280	69× 5	77	113× 95	11,900
62	54	265	72× 5¾	103	117×100	13,200
76	66	250	78× 6½	113	125×110	14,800
92	80	240	84× 7	134	133×115	16,350
106	94	230	90× 7½	175	141×130	19,250
128	112	220	96× 8	198	150×131	21,200
150	132	220	99× 8½	245	158×148	24,000
182	160	210	102× 10	291	163×158	26,400
204	184	200	108× 9½	307	188×169	34,500
232	206	195	108×16	444	194×180	39,900
276	246	190	114×16	587	206×200	53,000
322	288	175	114×18	664	216×211	58,100
380	340	170	120×20	885	232×228	73,700
450	400	170	117×23	1,000	232×234	87,600
490	432	160	122×22	1,150	248×249	95,750

For Electric Lighting.

*Test B.H.-P. on Town Gas.	*Test B.H.-P. on Suction Gas.	Revolutions per minute.	Flywheel.	Approximate Weight, Complete.	Overall Dimensions	Price, with H.D. Bolts (for Suction Gas).
				cwts.		Rs.
50	42	280	75× 6	87	116× 89	12,600
62	54	265	81× 7	111	121× 94	14,100
76	66	250	87× 8	129	129×104	15,750
92	80	240	93× 9	155	137×109	17,400
106	94	230	96×10	203	144×124	20,400
128	112	220	102×11¼	232	153×128	23,000
150	132	220	102×12¾	288	160×140	25,700
182	160	210	105×18	366	166×147	30,000
204	184	200	108×18½	449	188×160	38,300
232	206	195	114×21	525	197×168	43,900
276	246	190	117×23	701	209×185	56,400
322	288	175	126×25	800	222×196	63,700
380	340	170	129×26	1,030	237×210	80,900
450	400	170	129×30	1,200	237×210	96,000
490	432	160	132×32	1,370	253×228	1,04,700

*The "**Test Powers**" given in this Catalogue are the maximum Horse-Powers at the standard speeds to which the respective Engines are tested at the maker's works before despatch, and a Certificate of such Test will be furnished on application.

The margin to be allowed between the **Test Power** and the **Working Power** depends upon the nature of the work to be done, and the fuel used. We shall be pleased to advise on receipt of full particulars of the duty.

See Notes on Heavy Oil Engines.

Water Cooling Arrangements are not supplied unless specially ordered. For particulars of Mechanical Coolers see pages 532 to 536.

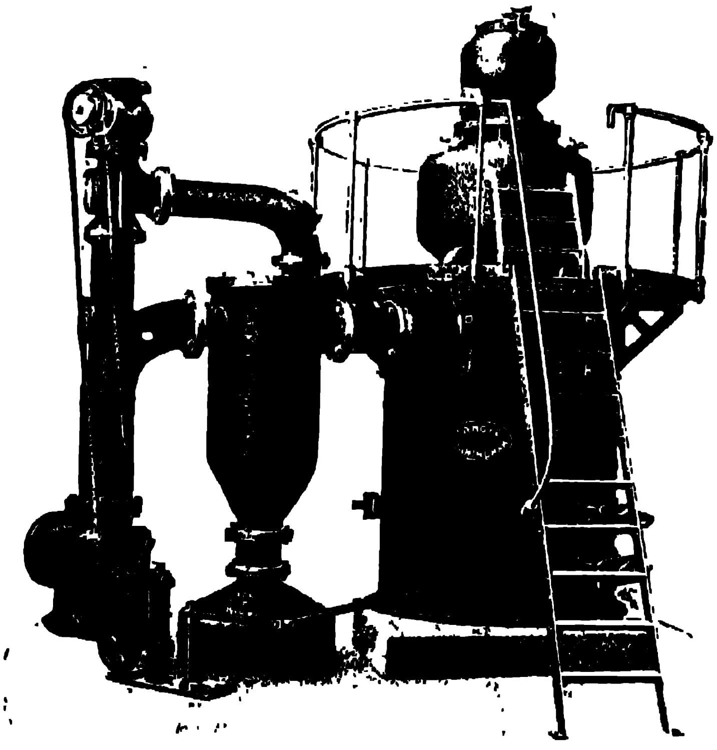
Driving Pulley is not supplied, unless specially ordered at an extra charge, but space is provided on the shaft for a pulley of sufficient size to transmit the full power of the Engine.

The **Engine for General Purposes** takes a single-width pulley between the Engine beds, alongside the flywheel.

In the **Electric Lighting series**, when the Engine is to be fitted to receive either a driving pulley of single width or a half coupling, the standard shaft has to be extended on one side (outside the main bearing); but an outer bearing is necessary if a pulley is fitted. The pulley, outer bearing or half coupling are not supplied unless specially ordered at an extra charge.

Tangye's "Suction" Gas-Producer.

For Charcoal.



"RRB" size "Suction" Gas-Producer for Charcoal.

The above illustration represents an "**RRB**" size "Suction" Gas-Producer for Charcoal Fuel; it was shipped to Borneo with a Tangye Coupled "HT" Type Gas Engine to drive an alternating-current Dynamo. The Gas-Producer is provided with charging platform and ladder, dust separator and collector, and the cock on the water seal and the blow-off cock are arranged to work in unison by means of a chain connection.

The dust separator and collector is supplied with all "Suction" Gas-Producers for Charcoal. The casing is fitted with a dividing plate, around which the gases circulate on their way from the generator to the scrubber, and in so doing the particles of dust fall through an open wing valve into the collector. At intervals of a few hours the wing valve may be closed, the side door on the collector opened, and the dust quickly removed while the plant is working, after which the side door is closed and the wing valve re-opened.

A separate fully illustrated section Catalogue on Tangye's Suction Gas-Producers will be posted on request.

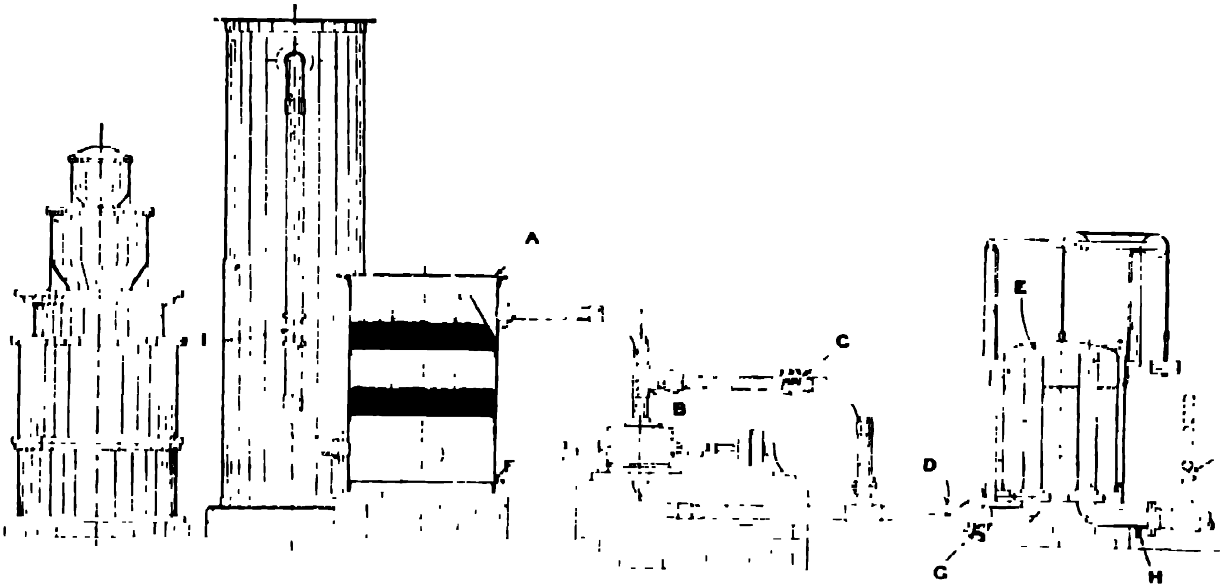
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Tangye's "Suction" Gas-Producer.

For Heating Purposes.



A.—Sawdust scrubber or purifier.
B.—Blower for drawing gas from generator.
C.—Bye-pass valve to allow excess gas to return to blower.
D.—Regulating valve operated from gas holder.
E.—Regulating gas holder.
F.—Drain cock on sawdust scrubber.
G.—Drain cock on inlet pipe to gas holder.
H.—Drain cock on outlet pipe from gas holder.
I.—Stop cock on outlet pipe from coke scrubber.
J.—Blow-off cock on outlet pipe from gas holder.

The Tangye "Suction" Gas-Producer is well adapted for supplying gas for tea driers, annealing ovens, lacquering stoves and other heating apparatus, either alone (as shown above) or in combination with a Gas Engine.

The gas is drawn from the generator through the usual coke scrubber by means of the Blower B, and is delivered into the Gas Regulating Holder E, whence it is distributed by convenient pipes to the various appliances requiring the gas. The Gas Holder maintains an even pressure of gas, and is provided with a trip motion which, when rising and falling, controls the Regulating Valve D, while the Bye-pass Valve C, which is loaded with weights, allows the excess gas to pass back again to the suction side of the Blower.

The Sawdust Scrubber A is only supplied when it is required to supply gas exceptionally free from dust and moisture.

When the Gas-Producer is required for heating purposes, including the Sawdust Scrubber A, it is necessary to mention this when enquiring or ordering.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

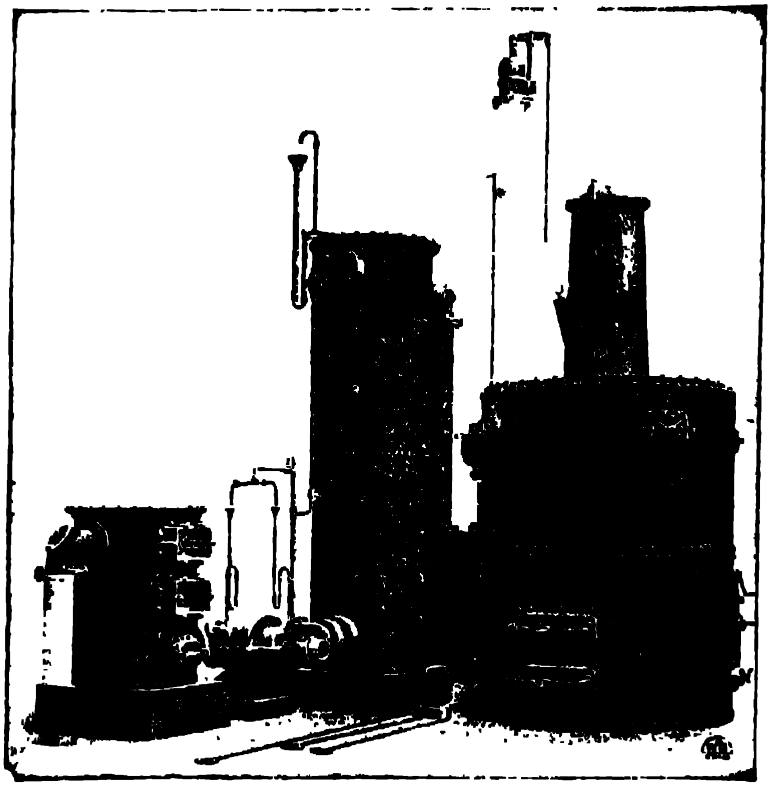
RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Suction" Gas-Producer.

(Patented.)

For Wood Refuse, Bituminous Coal, Lignite, Etc.

Motive Power from Wood Waste, Chippings, Sawdust, Bark, Etc.



Invaluable for use in Sawmills, Timber Estates, Plantations, Etc.

The reliability of the Tangye "Suction" Gas Producer designed for Wood Refuse is unquestionable, whether for ordinary duties or for long runs. The economy is such that three to four times as much power is obtained by using Wood Fuel in the Tangye "Suction" Gas-Producer than by consuming it under a Boiler for generating steam for a steam engine. It is therefore well worth the consideration of all power users who contemplate altering or extending their Mills On Plantations, the same type of Gas-Producer is used for working on Tea Prunings, Elephant Grass, Paddy Husk, etc.

In addition to the usual particulars required for quoting a Gas Engine, the following information should be furnished with regard to the Gas-Producer, *viz.*:—

1. The nature of the fuel to be used in the generator, whether blocks of wood, machine planings, bark, sawdust, chippings, shavings, or what other kind of wood fuel.

2. State whether the fuel is "green" or seasoned.

3. In the case of wood blocks, trimmings, chippings, etc., state approximately the dimensions of the pieces.

. Give the weight of wood refuse available per week as fuel in the generator; and if it is intended to use a mixture of the different kinds of wood refuse enumerated in question No. 1, state separately the weights of each different kind available per week.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

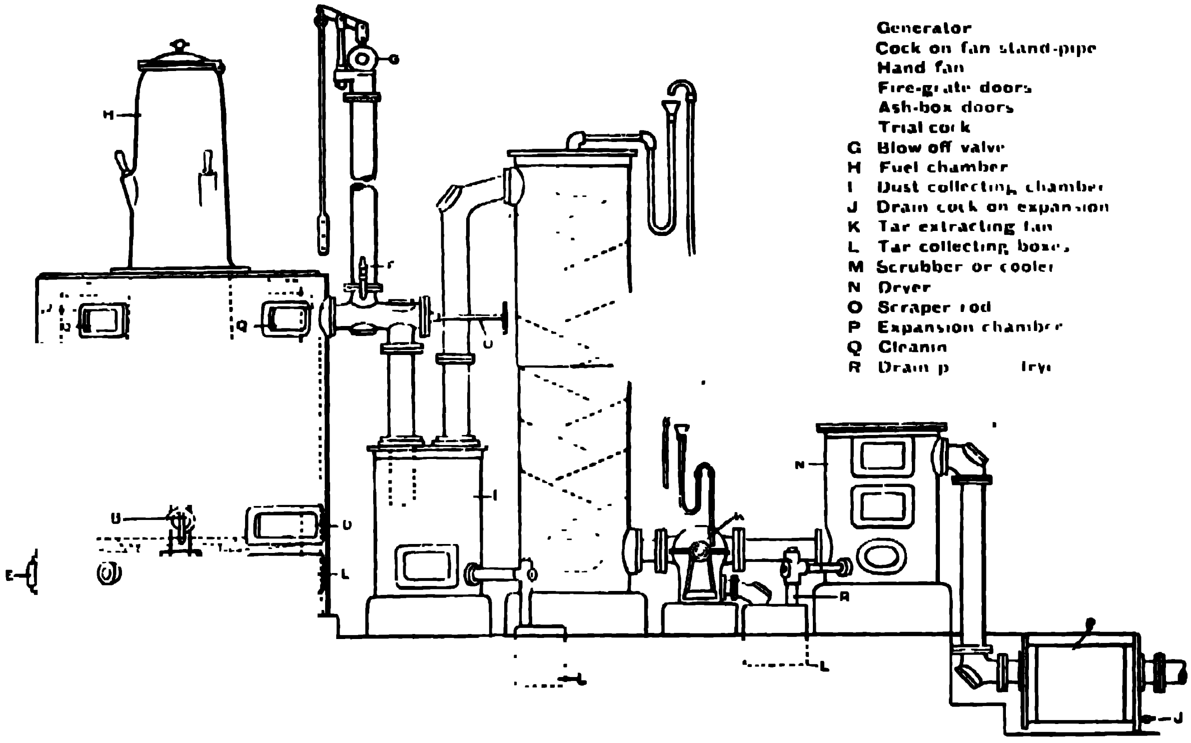
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Suction" Gas-Producer.

(Patented.)

For Wood Refuse, Bituminous Coal, Lignite, Etc.



The view on opposite page and the diagrammatic illustration shown above give a general idea of the Tangye "Suction" Gas-Producer for using as fuel wood refuse, bituminous coal, lignite, etc Owing to the great variety and grades of fuels that may be consumed in this type of Gas-Producer, it is impossible to tabulate particulars of the whole of them, but we mention three as under, *viz.*:—

1st. For Sawdust Only, and similar fuels such as machine planings.

2nd. For Wood Refuse, such as wood blocks only or wood blocks with a mixture of chips, machine planings, bark, sawdust and other wood waste, such mixture not to exceed about 25 per cent. of the total by bulk.

3rd. For Bituminous Coals, such as lignite, or bituminous coals of a non caking variety, containing not more than about 30 to 35% of volatile matter.

If the varieties or grades of the fuels to be utilized should vary from either of the above standards, it may be necessary to modify the dimensions of the generator or the gas-cleaning apparatus; full particulars should be forwarded with all enquiries and orders, including an analysis, if possible, of the bituminous coal or lignite; it is advisable in all cases to also send a small sample, say, 2 or 3 lbs., of the fuel to be used.

The Gas-Producer consists of a larger size **Generator** containing a fire-grate and bars, necessary fire and ash and cleaning doors, and is provided with fire-brick lining (supplied but **not** laid).

A **Hand Fan** is supplied for blowing up the fire when starting, it is carried on a stand-pipe, and the necessary stop cocks are provided for the efficient starting and working of the Gas-Producer

The **Dust Collecting Chamber** is made of steel plates and is provided with a cleaning door.

The **Cooling Scrubber** is made of steel plates, with cleaning doors, and is fitted inside with inclined baffle plates and a suitable water-sprinkling arrangement

A **Rotary Tar Extractor** with single-driving pulley is included. (The belting and line-shaft pulley are not supplied, as the method of driving depends upon the arrangement of the plant.)

The **Dryer** is made of steel plates, with large cleaning doors, and is fitted with drain cock.

The **Expansion Chamber** is made of steel plates and is provided with drain cock

The **Firing Tools** comprise a poker, rake, and long and short slicers.

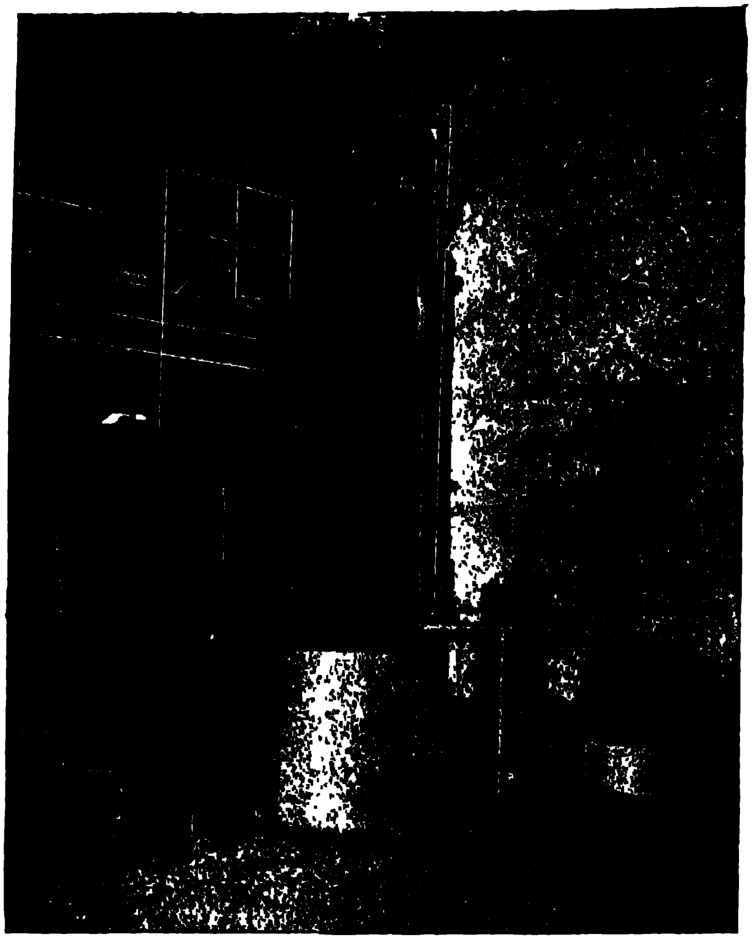
Pipe Connections, as shown in full shading in the illustration on the previous page are included up to the top outlet of the Dryer, but no farther, as the other connections depend upon the relative positions of the Engine and Producer. Scraper rods are fitted for cleaning the interior of the pipes of the Gas-Producer while in operation.

The blow-off pipe is not supplied, but a ball stop valve is provided for the latter.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Power Gas from Sawdust and other Waste Products.

These illustrations represent a Tangye "Suction" Gas Plant running on **Sawdust only,** and which is in daily use at the Works of Messrs. Price's Company, Limited, Belmont Works, Battersea, London, S.W. Writing under date of September 26th, 1912, a customer says:—

"We have much pleasure in stating that the 110 H.-P. Sawdust Gas-Producer and Engine which you installed for us is giving satisfaction. The average H.-P. which we require from it is about 90, and this is readily supplied by the plant at a fuel consumption of, say, 2½ to 3 lbs. of spruce and white deal sawdust per H.-P. hour."

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Suction" Gas-Producers.

Construction and Operation.—Simplicity is the keynote of the design of the suction producers so that they can be confidently placed in charge of any person of average intelligence.

Starting.—The plant can be re-started, after being shut down for an hour or so, in a few minutes, and even from a cold condition in from 15 for the small to 30 minutes for the large producers.

Attention.—After the apparatus has been started, there is no necessity for constant supervision, it being merely a question of seeing that the water supply is maintained, and that fresh fuel is provided about every three or four hours according to the nature of the fuel used.

No Escape.—With "Suction" Gas only the exact quantity required by the engine is made and there is no waste or blow-off of excess gas. The gas being at less than atmospheric pressure there is no risk of escape and explosion.

Stand-by Losses.—As compared with a steam plant, the stand-by losses of Tangye's "Suction" Gas-Producers are very small, and in the case of anthracite, gas coke, charcoal or bituminous coal they only amount to something like 5 per cent. to 7 per cent. per hour of the maximum B.H.-P. capacity of the Gas-Producer; with lighter fuels such as wood refuse, etc., the stand-by losses will be slightly more, but as the fuel is generally waste they may be regarded as negligible.

Attendance.—After the generator has been set to work, the only attention required is to supply the fuel and to keep the fire-grate clean. The amount of attention varies with the density of the fuel; with anthracite, the periods of charging vary from three to four hours, but with the lighter fuels the charging must be done more often.

Maintenance.—The maintenance cost of the Tangye "Suction" Gas-Producer is very low as there are no moving parts except the hand fan and (in the case of the Gas-Producers for wood refuse and bituminous coal) the rotary tar extractor. The wear and tear are practically confined to the fire-brick lining of the generator, but with reasonable care this will last from two to three years and sometimes longer. The fire-brick lining can be renewed at a small cost, and in the larger generators it may be necessary merely to replace the bricks which have been in contact with the fire. An allowance of 5 per cent. on the first cost may be taken as a fair average to cover renewals.

Numbers of Tangye's Suction Gas-Producer Plants have been working for years on Tea Estates and for other purposes in Ceylon and Southern India. A 110 B.H.-P. plant is to be seen working near Calcutta and one of about 120 B.H.-P. capacity is working near Lahore. We shall be pleased to give references to users and arrange for inspections of Tangye's Suction Gas Plants by *bonâ fide* inquirers.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Smaller Gas and Oil Engines.

Tangye's "AA" Type "Suction" Gas Engine.

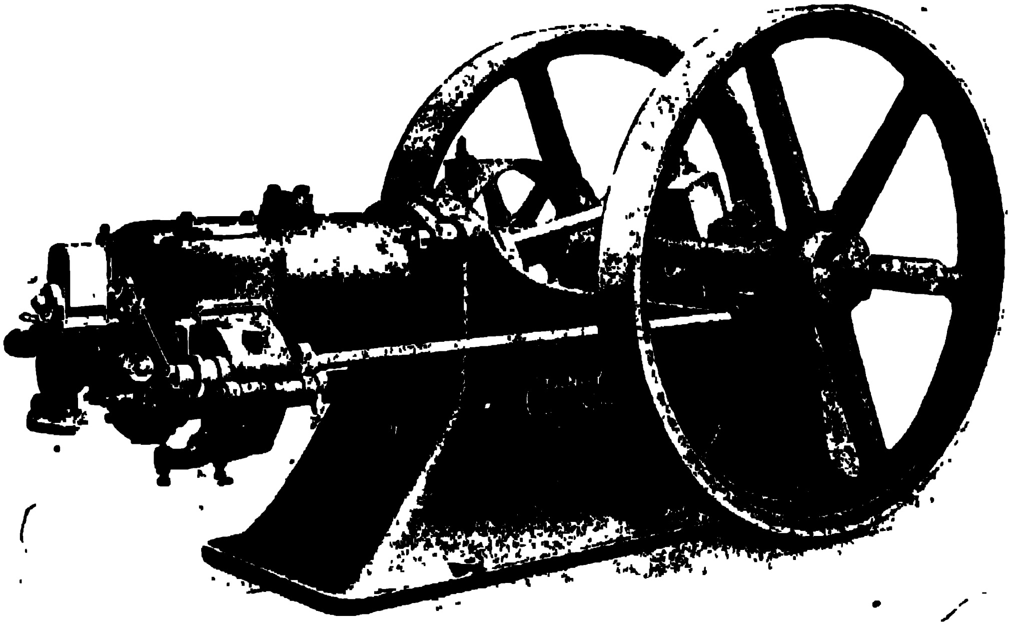


Illustration of Engine for General Purposes, with Deep Base.

Fitted with Magneto-electric Ignition Gear and Variable Timing Device.

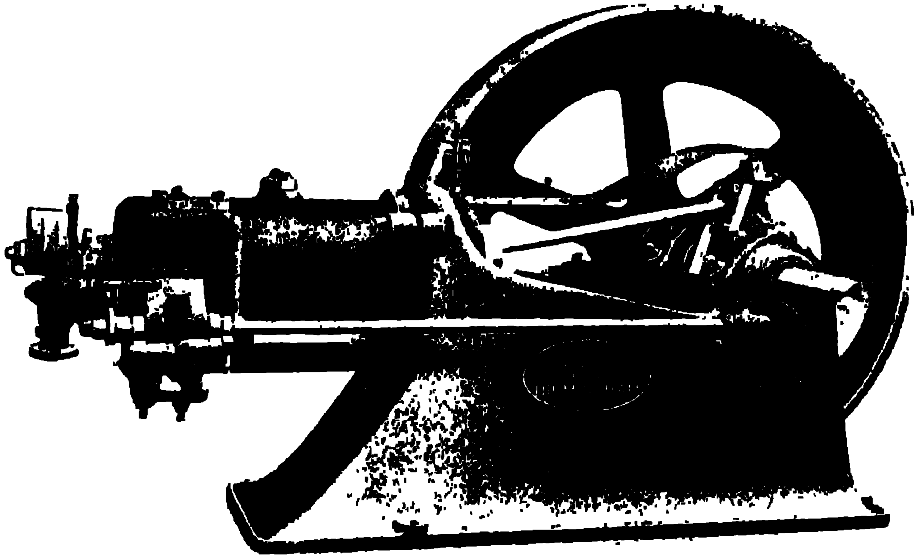


Illustration of Engine for Electric-Lighting, with Deep Base.

Fitted with Magneto-electric Ignition Gear and Variable Timing Device.

These Engines can be offered with shallow Bases if preferred at reduced cost.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

Tangye's "AA" Type "Suction" Gas Engine

For General Purposes.

Maximum Horse Power.		Revolutions per Minute.	Flywheels.	Pulley.	Overall Dimensions Engine only.	Price of Engine. (Deep Base.)	Charcoal Gas-Producer.
Brake	Indicated.						
			ins.	ins.	ins.	**Rs.**	**Rs.**
5	6	280	two 39 × 3½	12 × 7½	70 × 48	**2,200**	**1,250**
8	9½	270	„ 45 × 4½	16 × 8½	78 × 54	**2,600**	**1,670**
9½	11½	260	„ 51 × 4½	18 × 9½	92 × 59	**3,050**	**1,670**
12½	15	240	„ 57 × 5	20 × 11	100 × 69	**3,650**	**2,150**
16½	20	230	„ 60 × 5½	24 × 13	106 × 72	**4,100**	**2,150**
21½	26	220	„ 62 × 6	27 × 15	110 × 78	**4,900**	**2,560**
27	33	210	„ 64 × 6½	30 × 17	116 × 83	**5,600**	**2,560**

The Horse-powers in the above table are the maximum guaranteed with Tangye's "Suction" Producer Gas made from good quality Anthracite.

A deduction of about 5 per cent should be made for the maximum power when working on good charcoal.

These Engines are fitted with **Magneto-electric Ignition Gear** and **Variable Timing Device.**

Each Engine is provided with **Two Flywheels and Pulley.**

For Electric Lighting.

Maximum Horse Power.		Revolutions per Minute	Flywheel.	Overall Dimensions, Engine only.	Price of Engine (Deep Base.)	Charcoal Gas-Producer.
Brake.	Indicated.					
			ins.	ins.	**Rs.**	**Rs.**
5½	6½	320	one 48 × 7½	74 × 50	**2,560**	**1,250**
8½	10	300	„ 60 × 7½	83 × 54	**3,050**	**1,670**
10	12	280	„ 60 × 9	97 × 59	**3,600**	**1,670**
13	15½	260	„ 66 × 9	105 × 66	**4,450**	**2,150**
17½	21	250	„ 66 × 12	109 × 72	**5,050**	**2,150**
23	27½	240	„ 72 × 12	115 × 74	**5,900**	**2,560**
29	35	230	„ 72 × 15	120 × 80	**6,900**	**2,560**

Horse-powers.—See note above

These Engines are fitted with **Magneto-electric Ignition Gear** and **Variable Timing Device.**

Each Engine is provided with:—

A Continuous Crankpin Lubricator and Oil Splash Guard.

A Heavy Flywheel with extended shaft and outer bearing.

Prices.—The above prices are exclusive of extras such as foundation bolts, piping and cooling arrangements

Engines for Town Gas.—The above engines are also suitable for working on "Town" gas and when so working will develop about 15% to 20% greater power. The "Town" gas engines are usually supplied with Tube ignition and the equipment includes an anti-fluctuator Gas Bag to prevent the pulsations of the engine being communicated to the gas mains.

The Tangye's "AA" Type Gas Engine is fully described in a separate section list which we shall be pleased to send to all interested. Its general construction is on the same lines as that of the "AA" Type Oil Engine described in the following pages.

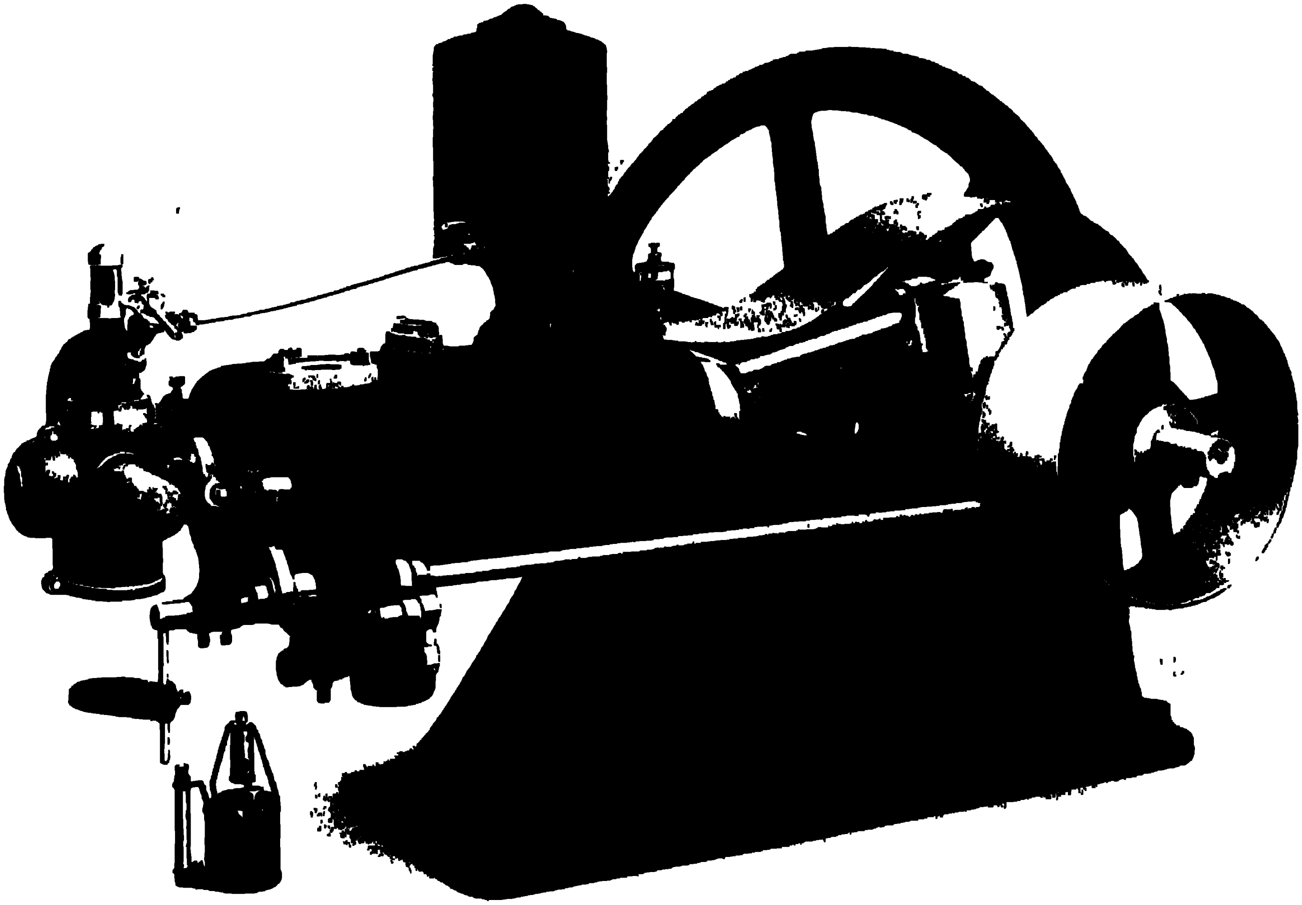
We recommend this type of engine to be used when economy in first cost and absolute simplicity in constructional details is the first consideration and in cases where only a moderate size of engine is needed. It is of generally lighter construction than the T3 Type Gas Engine described previously and governed on the "Hit and Miss" Principle instead of by varying the richness of mixture. The quality of the workmanship is in every way equal to that of the more expensive types but the designers have kept in view the requirements of buyers who require a lighter and cheaper engine.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The Tangye's
"AA" Type Oil Engine.



The simplest Engine on the market. Reliability demonstrated by 20 years of service in India.

Thousands of engines supplied to Indian users.
Spare Parts always available in India.

Smaller Gas and Oil Engines.

The Tangye "AA" Type Oil Engine.

For Kerosene Oil.

The Tangye "AA" Type Oil Engine is sufficiently well-known in every part of India, Burma and Ceylon not to require any elaborate description. Thousands of these engines have been supplied to buyers in India during the past twenty years and buyers everywhere testify to the satisfaction which these engines give. We can refer intending buyers to users of Tangye's Oil Engines in any part of India and we can quote numerous testimonials from satisfied users. The Government Agricultural Departments are among our largest buyers and find the Tangye engine the ideal type for the agriculturalist who has little experience, if any, in mechanical work.

Principal Features and Advantages of Tangye's "AA" Type Engines.

Simplicity.—The design of the engine is as simple as possible, all unnecessary complications having been cut out in the endeavour to make an engine which can be easily understood and readily worked by the average user with limited mechanical knowledge.

The Oil Feed is by gravity from a tank over the engine cylinder (hence "Gravity Feed Type"). This greatly simplifies construction as the fuel pump with small valves and springs and operating gear is thereby eliminated.

Economy.—The Tangye's Oil Engine is as economical as any engine in the market and a great deal more economical than many makers' engines. Test figures can be supplied to those interested.

Reliability.—The reliability of the engine is beyond question: we can give instances of engines which have been at work for twenty years and more and are still giving good service.

Spare Parts.—The question of the supply of spares for engines is almost of greater importance than the engine itself. It is inevitable that engines having a long life will require renewals from time to time and in the supply of these we pride ourselves on offering the Tangye's Oil Engine buyer **the best spare part service in India.** The value of this to the buyer is inestimable, as the loss which would otherwise occur through inability to supply a small part of an engine may easily be more than the total value of the engine if a lengthy stoppage occurs.

Instruction Books. Vernacular Instructions. An Instruction Book is supplied with every engine. In addition to this we have our own "Abbreviated Instruction Book" which contains general instructions on starting up and notes of special interest to buyers in India. **This book is printed in English, Bengalee, Urdu and Hindi.**

Foundation Drawings.—A set of foundation drawings are supplied with every engine.

Erection of Engines. Starting Up and Overhauling. We have a staff of Oil Engine experts and skilled *mistries* who can be sent to erect engines for buyers and give any necessary instructions in the working and care of the engines.

The staff is available for any inspection, repairs or overhauls which may be required in later years

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "AA" Type Oil Engine.

General Description.

Design.—The general design embodies all the latest improvements introduced to internal combustion Engines of this class, combining great strength and rigidity with good general appearance, and extreme simplicity of working parts.

Bed.—The Engine bed is massive, and well adapted for heavy work, and an oil groove is formed all round the bedplate. It is made in two forms, *viz.*:—

(1) With deep base.
(2) With shallow base.

The latter form is intended for erecting on a brick or stone foundation, and is usually preferred by exporters for the purpose of keeping down the cost of freight

Cylinder.—The Cylinder Jacket, Combustion Chamber, and Exhaust Valve Box are cast in one piece. The construction of the cylinder and the arrangement of the valves are such as to obtain the highest efficiency and economy, and to render them easily accessible. Ample space is provided for the free circulation of the cooling water around the walls and valve seats most exposed to the temperature of the explosions.

Loose Liner and Piston.—The Cylinder is fitted with a removable Liner which, in case of renewals, can be readily replaced at a low cost, and without returning the cylinder to the Works The Liner and Piston are of improved construction, and made of a specially hard metal.

Water Injection to Vapouriser.—All Engines (except the 2¾ and 3½ B.H.P. sizes) are fitted with an improved method of water injection to the vapouriser, the small quantity of water being drawn from the cylinder jacket into the vapouriser through a sniffting-valve, on each "charging" stroke of the Engine On entering the hot vapouriser, the water is immediately converted into vapour and cools the incoming charge, thereby enabling an increased compression to be used, with a consequent increase in efficiency and economy of fuel; and ensuring quieter and cleaner running.

Starting.—The Engine can be started in from four to seven minutes, according to the size. The ignition of the explosive charges is effected **at starting** by means of an external tube heated by a blow-lamp placed on a bracket under the vapouriser.

Automatic Ignition.—After the Engine has been started and run for a short time, the lamp and the external ignition tube are not required The charges are then ignited by a special arrangement of internal tube enclosed in a casing filled with non-conducting material, heated by the hot gases during combustion of the successive charges. The timing of the ignition is controlled by a regulating valve.

The ignition tubes are of nickel alloy, and are perfectly certain in action; they are very durable, and are easily replaced when necessary.

Oil Supply Tank Gravity Feed.—A galvanized-iron tank of ample capacity is provided for the oil supply, fitted on the cylinder, and with connections to the vapouriser.

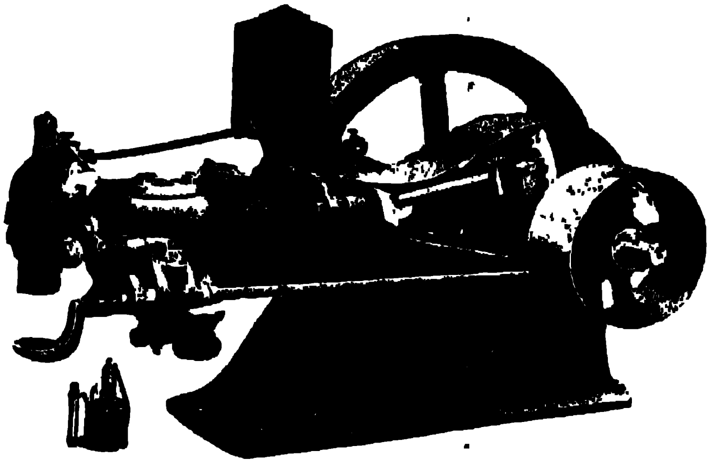
Governor.—A specially sensitive Governor is provided, giving great economy and steadiness under all conditions of working. It operates on the "hit-and-miss" system, and is of the "incline" type—a simplified form of governor having very few parts and eliminating the necessity for skew gears for driving. The whole Governor can be renewed, if necessary, at the cost of a few rupees.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "AA" Type Oil Engines.



Crankshaft and Splash Guard.—The Crankshaft is of best selected mild steel, made from one forging, with the throw cut of the solid, and machined bright all over. It runs in long adjustable gun-metal bearings. Oil Splash Guard over the Crankshaft is fitted on all Engines.

Connecting Rod.—The Connecting Rod is of hammered iron turned and polished all over, and has adjustable brasses at both ends, which can be readily renewed.

Side Shaft.—The Side Shaft is of steel, fitted with machined cams, and driven by machine-cut skew gear wheels running in an oil bath. (*Note.*—Numbers of engines are made with skew gears cast and not machined. This leads to increased friction and rapid wear.)

Flywheels.—The Engine for General Purposes is fitted with Flywheel or Flywheels machined on face and edges. For engines up to 16 B.H.P. single Flywheels are recommended and supplied but two Flywheels can be fitted if preferred.

In the Electric Lighting series the Engine has a single heavy Flywheel turned for belt-driving, and is provided with extended shaft and outer bearing, except the 2¾ and 3½ B.H.P. sizes, which have two Flywheels of equal size, one on each side of Engine.

Lubrication.—Lubrication for the cylinder is effected by means of a sight-drop oiler, of ample capacity, which can be regulated while the Engine is running. Lubrication of the bearings is amply provided for by means of large oil boxes fitted with syphon wicks. The crosshead pin is fitted with independent lubrication, except on the 2¾ and 3½ B.H.P. sizes.

On the Electric Light Engines, the crankpin is fitted with a "continuous" lubricator, which admits of the Engine being run for considerable periods without stopping to oil.

Accessories.—With each Engine is provided:—

A cast-iron exhaust chamber. Main oil-supply tank. Blow-lamp for starting (on Engines up to 33 B.H.P.). Cleaning tools. A set of spanners. Foundation plan, with full instructions as to fixing and working.

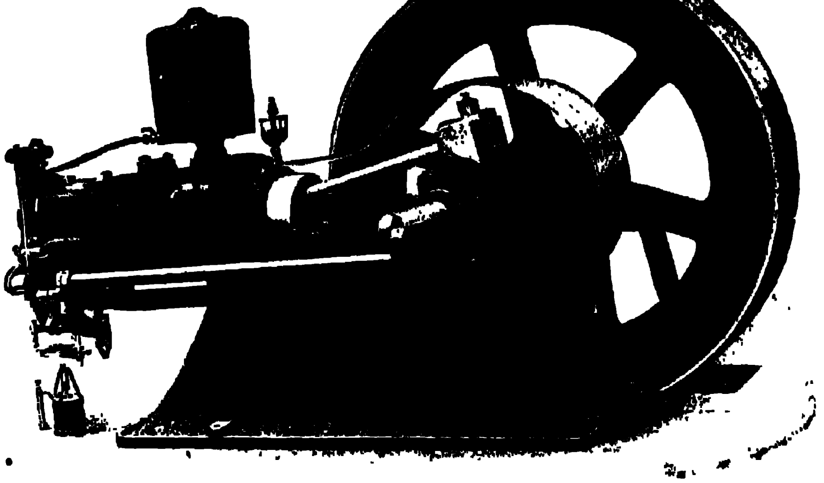
Spares.—The following **Spare Parts** are provided:—

One piston ring. One spring of each size used on the Engine. One ignition tube. Two vapouriser joints, except with the 2¾ and 3½ B.H.P. sizes, which have only one joint.

Materials and Workmanship.—All materials used in the manufacture of Tangye's Oil Engines are of best quality only, and first-class workmanship is employed in their construction, erection and testing.

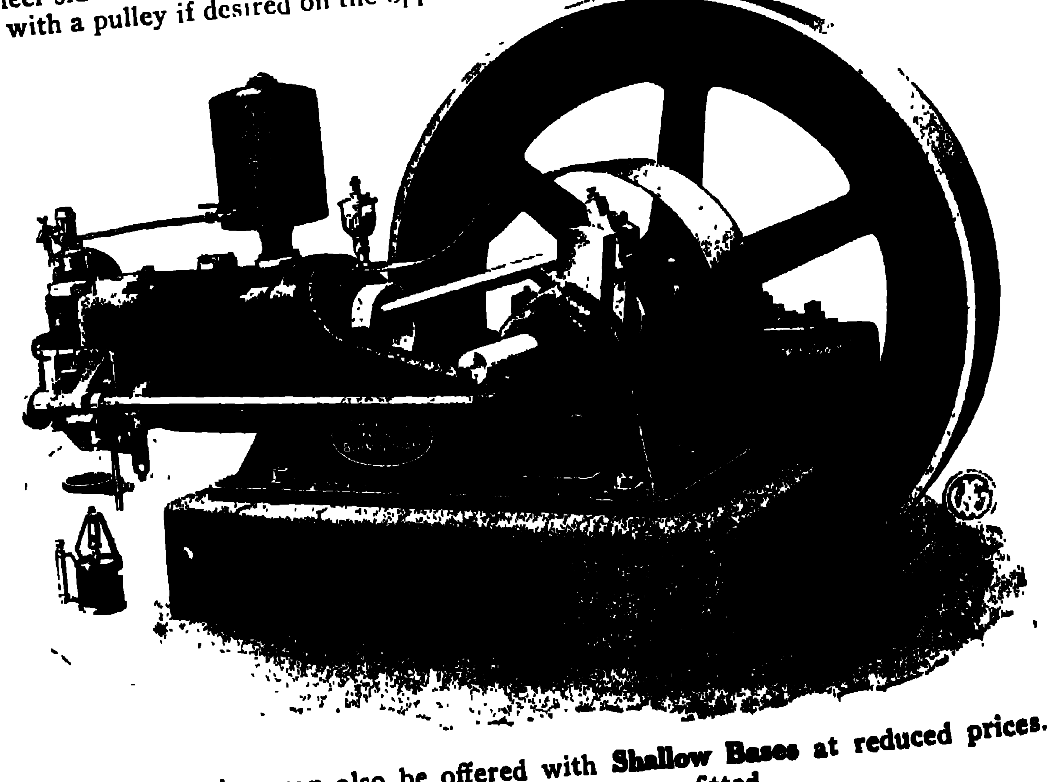
Engine is carefully painted in a first-class manner with enamel paint.

Alternative Types.



Electric Lighting Type.

The above illustration shows the type of engine offered for electric lighting purposes. It is the same as the ordinary type except that the crankshaft is fitted with balance weights and is extended to carry a specially heavy flywheel. An outboard bearing is provided on the flywheel side and the flywheel is turned to take a belt drive. The crankshaft can also be fitted with a pulley if desired on the opposite side to the flywheel.



All types of engines can also be offered with **Shallow Bases** at reduced prices. illustration shows an engine of the Electric Light Type so fitted.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS
BOMBAY, LONDON.

Usual Stock Sizes of Tangye's Oil Engines.

Gravity-Feed, Deep Base Type.

Brake Horse-Power.	Speed in Revolutions per Minute.	Size of Flywheel.		Size of Standard Pulley. (Not supplied unless specially ordered.)	Space required exclusive of Tanks.	Weight of General Purposes Deep Base Engine and Accessories.					
		Ordinary Type.	Electric Light Type.			Nett.			Gross.		
		Ins.	Ins.	Ins.	Ft. Ins. Ft. Ins.	cwt.	qrs.	lbs.	cwt	qrs.	lbs.
2¾	370	One 27×3¾	Two 27×3¾	8×5½	4 0×2 9	8	0	12	9	3	16
3½	370	„ 27×3¾	„ 27×3¾	8×5½	4 0×2 9	8	0	12	9	3	16
5½	320	„ 36×4	One 48×5½	12×6½	5 9×3 9	13	0	16	15	0	24
7	300	„ 39×4	„ 48×7½	16×6½	6 3×4 0	16	0	20	18	3	0
10	275	„ 45×5	„ 60×7½	18×8½	7 0×4 6	22	1	24	25	1	14
13	265	„ 54×5	„ 60×9	20×9½	8 0×5 0	30	0	8	34	1	16
16	260	„ 57×6	„ 66×9	24×11	8 6×5 0	34	0	0	38	3	8
19	250	Two 54×5	„ 66×9	24×12	8 6×5 6	39	3	24	45	0	12

Larger engines up to 45 B.H.P. can be supplied for working on kerosene oil but we recommend Tangye's Semi-Diesel Crude Oil Engines above 20 B.H.P. and can supply them in smaller sizes also if desired.

PRICES of "AA" TYPE ENGINES.

Brake Horse-Power.	Prices of Engines and H.D. Bolts.			Extras.		
	Deep Base Type.	Shallow Base Type.	Electric Light Type.	Standard Pulley.	Standard Pipes.	Tanks.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
2¾	1,130	....	1,250	20	60	60
3½	1,205	....	1,290	20	60	60
5½	1,595	1,560	1,880	30	95	75
7	1,820	1,750	2,160	40	95	140
10	2,280	2,190	2,780	70	125	140
13	2,730	2,650	3,370	80	130	220
16	3,035	2,905	3,790	120	155	450
19	3,440	3,395	4,100	125	165	450

Electric Light Engines have three crankshaft bearings and are generally as illustrated and described on the opposite page. They can also be offered with shallow base at reduced prices.

Prices of Tanks are for double capacity tanks to suit tropical conditions of working.

General Notes and Hints to Intending Buyers.

Selection of Size.—In purchasing an oil engine it is always advisable to allow a margin of power, i.e., it is not advisable to run an oil engine continuously at its full rated power. The power for which an engine is rated is available when required, but when the load is a steady one, as in electric light installations, driving mills or pumps, etc., it is advisable to allow a suitable margin between the actual working power of the engine and the power at which it is listed. When driving groups of machines, or machines in which the power required for driving is variable, this margin may sometimes be eliminated altogether. We shall be glad if our constituents will advise us what machines (with sizes) and shafting are to be driven and we shall then be pleased to recommend a suitable engine.

Tangye's Portable Oil Engine.

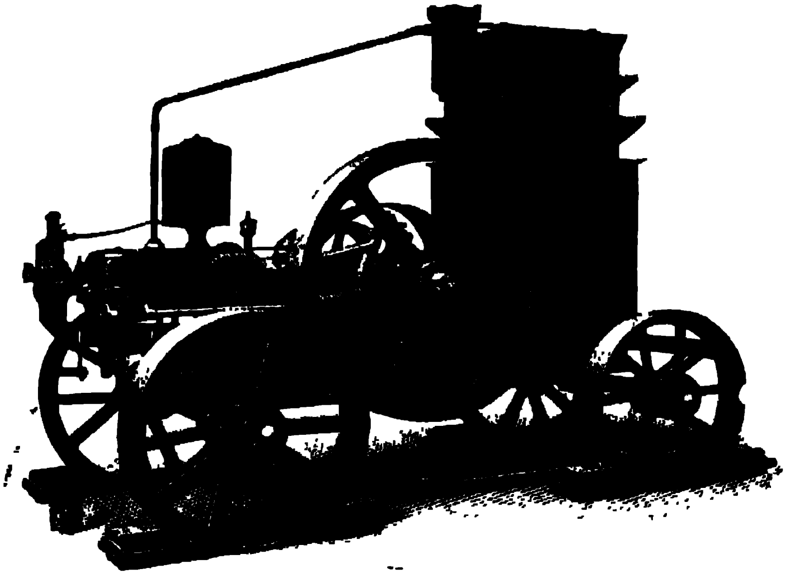


Illustration representing the 13 and 16 B.H.P. sizes.

This arrangement consists of an Oil Engine with gravity oil-feed and shallow base, generally as described in the previous pages. The Engine is mounted on a portable carriage built of strong steel channels, fitted with swivelling fore-carriage for convenience in moving about from place to place; wrought-iron axles and strong road wheels, with a set of chocks and bars for securing the Engine in position when at work. The exhaust chamber is embodied in the carriage, and a suitable water cooling tank or tower is provided with necessary pipe connections.

Test Power.		Revolutions per Minute.	Flywheel.	Pulley.	Overall Dimensions. Minus Shafts.			Price.
B.H.P.	Indicated H.P.							
			Ins.	Ins.	Length.	Width.	Height.	Rs.
2½	3¼	370	One 27×3¼	8×5½	70	43	64	1,750
3½	4¼	370	" 27×3¾	8×5½	72	43	64	1,780
5½	6¾	320	" 36×4	12×6½	94	50	70	2,230
7	8½	300	" 39×4	16×6½	112	55	78	2,610
10	12	275	" 45×5	18×8½	122	63	83	3,390
13	15½	265	" 54×5	20×9½	150	69	94	4,650
16	19	260	" 57×6	24×11	150	74	105	5,370

A pair of shafts for one horse or two bullocks is supplied with the 7 B.H.P. and larger sizes, and a drag handle with the 5½ B.H.P. and smaller sizes.

Portable Oil Engines and Pumps.

We can offer a number of sizes of Portable "AA" Type Oil Engines combined with Centrifugal Pumps. These sets are of great utility for low lift irrigation, pumping out shallow quarries, foundations, etc., in cases where the suction lift is limited to about 18 feet.

Tangye's Gas Oil Engine.

The above oil is stocked by us in 1 and 5-gallon drums, and 40-gallon casks and is specially recommended for the cylinder lubrication of oil engines. Engines lubricated with this oil are guaranteed for one year against breakage of any part due to excessive wear or faulty material.

It is of the utmost importance that only special oil should be used for cylinder lubrication. More engine troubles are due to the use of Castor or other unsuitable oils than to any other cause.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON

Some Users of Tangye's Oil Engines.

Some Places where Working.

Agra.
Akyab.
Allahabad.
Aligarh.
Amritsar.
Arambagh.
Azamgarh.
Balrampur.
Bankipur.
Bara Banki.
Bareilly.
Bassein.
Benares.
Berhampur.
Bezwada.
Bhagalpur.
Bombay.
Budge-Budge.
Burdwan.
Burnala.
Calcutta.
Cawnpore.
Chittagong.
Cuttack.
Dacca.
Delhi.
Deoghur.
Darbhanga.
Fategarh.
Garden Reach.
Giridih.
Goalundo.
Hissar.
Hooghly.
Howrah.

Tangye's Oil Engines in Calcutta.

At the Bengal Chemical and Pharmaceutical Works. One 12 B.H.P. Engine, one 24 B.H.P. Engine and one 60 B.H.P. Engine.

At the Edinburgh Press (Bow Bazar). One 30 B.H.P. Engine.

At Messrs. James Glendye's Printing Works. One 13 B.H.P. Engine.

At Garden Reach (Municipal Pumping Plant). One 13 B.H.P. Engine.

At the Britannia Engineering Works (Messrs. McLeod and Company). Two 50 B.H.P. Engines and one 24 B.H.P. Engine.

At the Indian Boot and Shoe Works. One 50 B.H.P. Engine.

At the Bengal Leather Manufacturing Company. One 19 B.H.P. Engine

At the Government Research Tannery. One 19 B.H.P. Engine.

At the North-West Soap Company (Garden Reach). One 70 B.H.P. Engine.

At the Fort William Flour Mill. One 23 B.H.P. Engine.

At the Universal Machine Tool Company. One 13 B.H.P. Engine.

At the Acme Oil Mills. One 42 B.H.P. Engine.

At the Calcutta Oil and Cake Mills. One 100 B.H.P. Engine.

At Messrs. Chari and Company's Cigarette Factory. One 110 B.H.P. Suction Gas Plant.

Some Places where Working.

Jagadhir.
Jalpaiguri.
Jaunpore.
Jessore.
Jhansi.
Julana.
Kalimpong.
Kushtia
Lahaganj.
Lahore.
Lucknow.
Lyallpur
Madras.
Mandalay.
Manmad.
Mhow.
Midnapur.
Miranshah.
Mirzapore.
Mozufferpore.
Murshidabad.
Narkaldanga.
Patna.
Poona.
Rampur (U.P.)
Rampuraphul.
Ranchi.
Rangoon.
Sarimir.
Shikoabad.
Tezpur.
Tundla.
Trichinopoly.
Umballa.
Etc., etc.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Spare Parts For

Tangye's "AA" Type Oil Engines.

List of Names of Parts.

(For Illustrations, See opposite page.)

1 Main Chair Brasses
3 Drain Cock for Bed
4 Crankpin Front Brass.
5 „ Back „
6 Connecting Rod Bolts
7 Compression Plates
8 „ Washers
9 Crankpin Oil Stopper
11 Crosshead Pin Set Screw.
12 „ „ Brasses
13 „ „ „ Adjusting Screw
14 Liner
15 Piston.
16 „ Rings.
17 „ „ Stops
18 Exhaust Valve Cover.
19 Cleaning Hole Cover.
20 Indicator Plug.
20a Plug for Indicator Gear.
33 Air Pipe.
34 „ „ Flange.
42 Starting Cock Body and Union Nut
43 „ „ Plug.
44 „ „ Dial
45 „ „ Handle.
46 „ „ Bolt and Wing Nut
47 Oil Nipple.
48 Bed Bracket.
49 Governor Bracket
50 Sprag Plate
51 „ „ Carrier.
52 „ Spring.
53 „ „ Eyebolts.
54 „ Shaft.
55 Pecker Lever.
56 „ Plate
57 „ Stop
58 „ Spring
59 „ „ Eyebolt.
60 „ Lever Shaft.
61 Sprag Lever
62 „ Rod and Collars.
63 „ „ Spring.
64 Governor Lever.
65 „ „ Centre Pin.
66 „ „ Roller.
67 „ „ „ Pin.
68 „ Incline
69 „ Pecker.
70 „ Springs.
71 „ Spring Eyebolt and Regulating Nuts.
72 Governor Incline Friction Pin
73 First Motion Wheel
74 Second Motion Wheel.
75 Motion Wheel Guard, Top Half.
76 „ „ „ Bottom Half
77 Governor Cam
78 Exhaust „
79 „ „ Roller
80 „ „ „ Pin.
81 Relief Handle, with Plug, Friction Pin, and Spring Washer
82 Exhaust Lever
83 „ „ Sprag Plate
84 „ „ Centre Pin.
85 „ „ Adjusting Screw.
86 „ Valve.
87 „ „ Spring.
88 „ „ Bridle and Pin.
89 Anchor Bar
90 Eyebolt.
91 Exhaust Valve Guide and Nut.
115 „ Spring Cup.
116 Air Valve Lever, No. 1.
117 „ „ „ „ 2.
120 Coupling Rod.
121 „ „ Washer and Nuts.
122 „ „ Pin.
123 „ „ Spring.
124 Trip Lever.
156 Bed Oil Tube.
157 Crosshead Pin.
158 „ „ Oil Tube.
159 „ „ Filling Elbow.
160 Vapouriser.
161 „ Coupling Nut.
162 „ Ignition Tube.
163 „ Cowl.
164 Air Valve and Cushion Piston
165 „ Box.
166 „ Spring
167 „ Stop.
168 „ Spring Cup and Washer
169 „ Bonnet.
170 Air Bend.
171 Vapouriser Oil Supply Tank
172 Strainer for Oil Supply Tank.
173 Lid for Oil Supply Tank.
174 Bung on Oil Supply Tank.
175 Oil Cock.
176 Vapouriser, Supply Pipe and Nuts
177 Air Valve Lever Bracket
178 „ „ „ Centre Pin
179 Auto-Igniter Ignition Tube.
180 „ Chamber.
181 „ Cover.
182 „ Adjusting Screw.
183 „ Lock Nut.
184 „ Dial.
185 Water Injection Valve Box.
186 „ „ „ and Nuts
187 „ „ „ Spring
188 „ „ „ Box Nipple.
189 Water Regulating Valve.
190 Water Pipe and Union Nuts.
191 Cylinder Sight Feed Lubricator.
204 Crosshead Pin Lubricator Pipe.
205 „ „ Oil Catcher.
206 „ „ „ „ Pipe.
207 Blow Lamp.
208 „ Bracket.
209 Pillar.

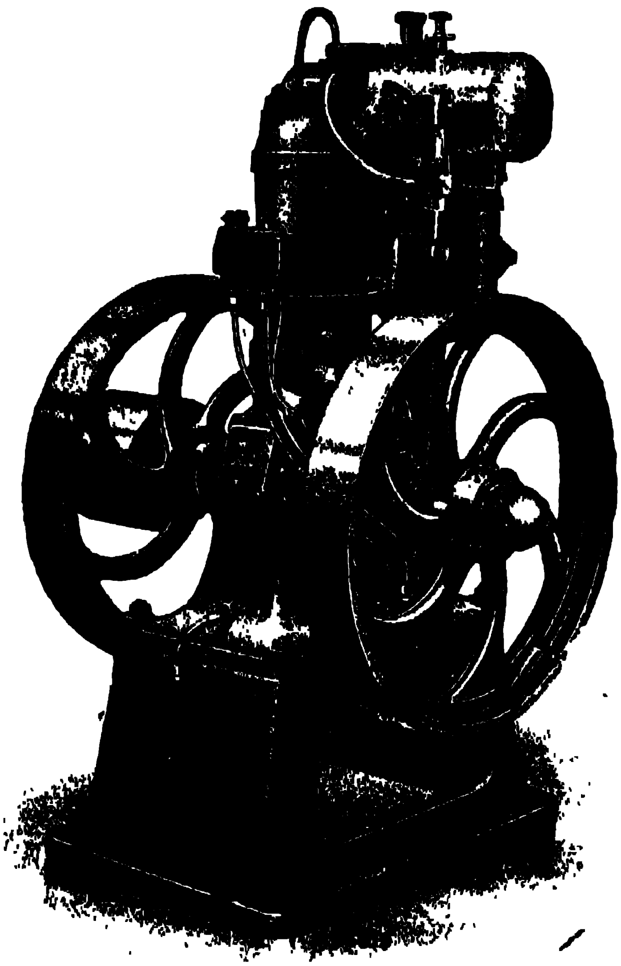
We carry a very large stock of the above Spare Parts and can usually deliver any required part per return.

CALCUTTA, JAMSHEDPUR, **JESSOP & Co. LTD** RANGOON, MADRAS,
DELHI, LUCKNOW. **ENGINEERS** BOMBAY, LONDON.

The "Wizard" Kerosene Oil Engine.

Made by Messrs. Ransomes, Sims and Jefferies, Ltd.

Gold Medal Awarded, Calcutta Exhibition, 1923-24.



Description.

The "Wizard" Paraffin Oil Engine designed and manufactured by Messrs. Ransomes, Sims and Jefferies, Ltd., embodies several special features which distinguish it from the generally known designs of small oil engines.

The engine is of the vertical type, totally enclosed, and works on the simple two-cycle principle, but it differs considerably from other engines of this type in the method of injecting and burning the fuel. It is provided with automatic lubrication, and it will run for a considerable period without attention and at a minimum cost for fuel.

The distinguishing feature of the engine is the system adopted for starting and ignition. The vapourising and combustion of fuel is obtained solely by compression, thus eliminating need for magneto, carburettors, hot bulb and lamp or other outside auxiliary means for vapourising and ignition. The engine starts from cold on the same fuel oil on which it ordinarily runs, the use of petrol for starting being entirely unnecessary. The whole of the vapourising takes place inside the cylinder itself; ignition is automatic, and occurs at the correct time and independent of the speed or load on the engine.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The Ransomes' "Wizard" Paraffin Oil Engine.

Lubrication has received special attention. A sight feed lubricator supplies oil to a double plunger pump which forces the oil to the main bearings, connecting rod big end, and to the cylinder. The flow of oil can be regulated to prevent waste.

Fuel.—Tests made in India show that the engine will work satisfactorily when using "Victoria" Brand or similar cheap Kerosene oils.

The engine is easily started by turning a fly wheel, a handle being fitted in the rim for this purpose. Half-compression is obtained by depressing a spring loaded steel valve in the cylinder head.

The elimination of magneto and carburettor in small engines is a gain which will be appreciated by every user. The temptation to "adjust" these delicate parts is strong in most drivers and the results are often disastrous. Magneto repairs are expensive and seldom satisfactory.

The Engines can be supplied as portable or stationary units, as required.

Stationary Type.

Working B.H.P.*	Speed R.P.M.	Flywheels Inches		Fuel Tank	Weight.		Price of Engine.	Price on C.-I. Base.
		Dia.	Face.	Gallons.	Engine.	C.-I. Base.		
					Cwts.	Cwts.	Rs.	Rs.
3½/4	600	28½	3	2	7	2	1,000	1,080
6/7	500	33	4	3½	9½	2	1,340	1,450

*The usual allowances must be made for temperature and elevation above sea level

The stationary outfit includes:—Fuel tank and pipe connections, exhaust silencer and one length exhaust pipe (2 ft. 9 ins. for 3½ B.H.P., 3 ft. 10 ins. for 6 B.H.P.). Foundation bolts are included. The engines can be supplied for fixing to a concrete foundation, or on a cast-iron base.

Water.—Water cooling arrangements are extra. A driving pulley of suitable size for the machine to be driven can be supplied at a charge depending on the size.

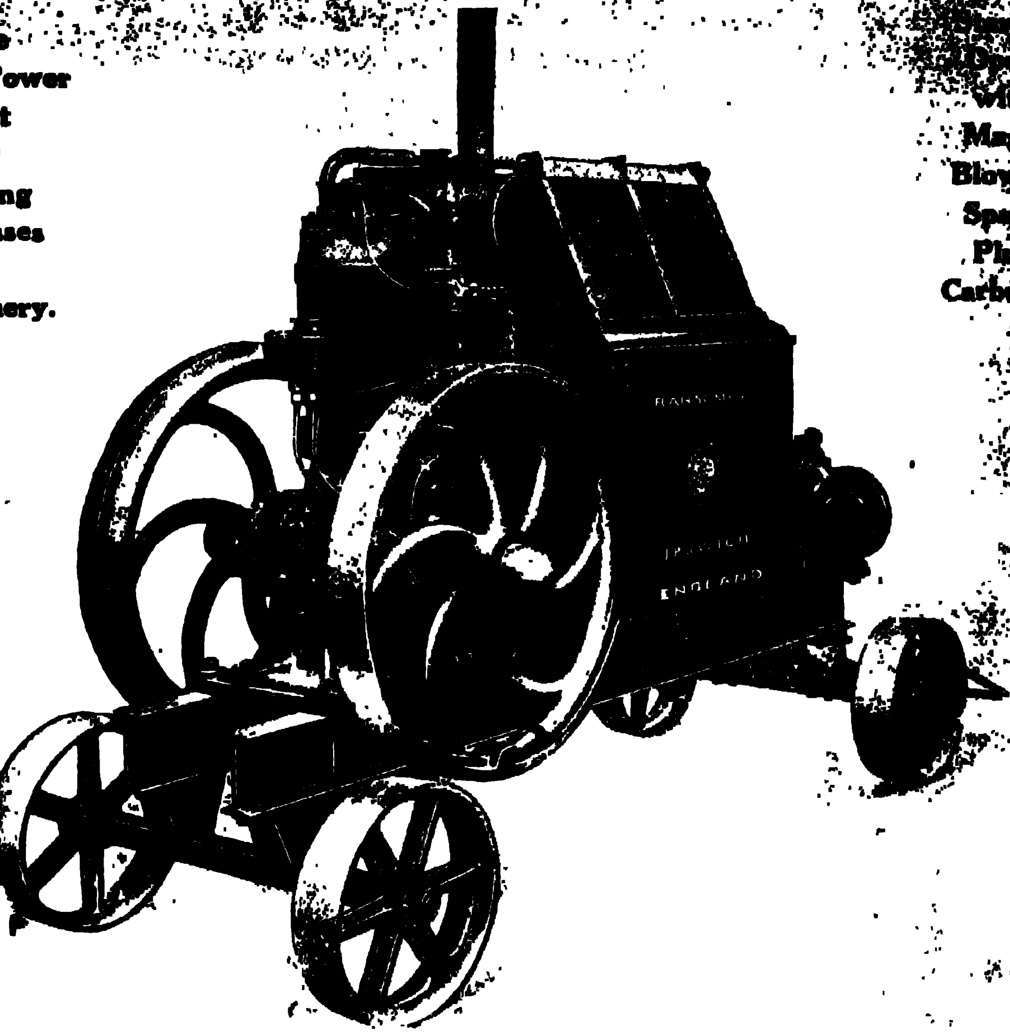
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD** RANGOON, MADRAS, BOMBAY, LONDON.

Ransomes' "Wizard" Oil Engine.

Portable Type.

The Ideal Power Unit for Driving All Classes of Machinery.

Starts and Operates without Magneto, Blow-lamp, Sparking Plug or Carburettor.



Low Maintenance and Running Costs.

Portable Type.

Continuous Working B.H.P.	Speed R.P.M.	Flywheels. Inches. Dia.	Flywheels. Inches. Face.	Pulley. Inches. Dia.	Pulley. Inches. Face.	Fuel Tank. Gals.	Total Weight Cwts.	Total Weight Qrs.	Price as illustrated. Rs.
3½/4	600	28½		9	6	2	10	0	1,360
6/7	500	33		10½	7½	3½	14	2	1,900

Portable outfit includes:—Rectangular water cooling tank, water circulating pump with connections fuel tank and pipe connections, exhaust silencer and pipe. Mounted on hard wood or steel frame with steel axles and cast-iron wheels, swivel front axle fitted with drawbar.

The Ransomes' "Wizard" was awarded

A Gold Medal at the Calcutta Exhibition, 1923-24, and The Silver Medal

of the Royal Agricultural Society of England at Derby, June, 1921.

The only Award for Oil Engines.

We can also offer these engines with portable pumping sets. See Pump Section Catalogue.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

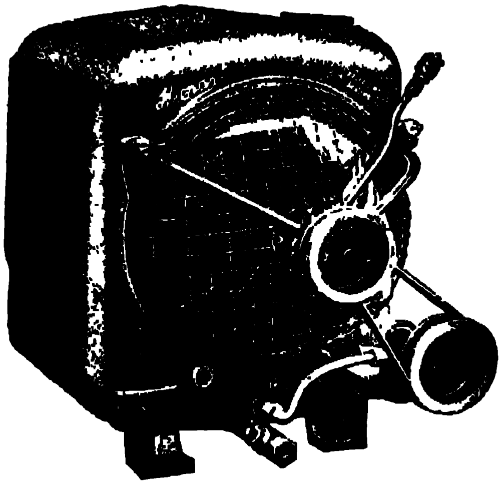
JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

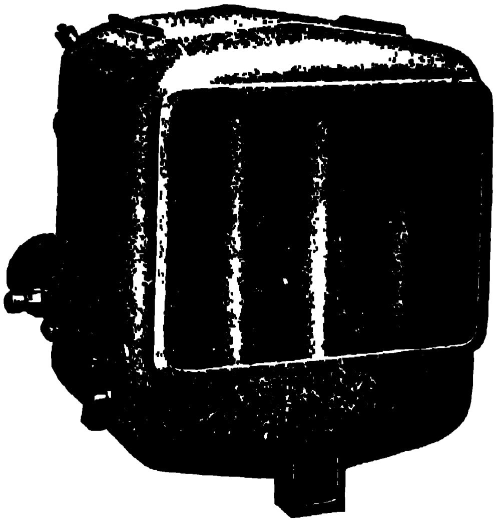
The "Heenan" Patent Water Cooler.

Gold Medal Awarded, Calcutta Exhibition, 1923-24.

(Jessop & Co., Ltd.—Sole Agents).



Cooler shewing Fan, Fan-guard and Pulleys.



Outlet view of Cooler shewing Eliminator.

The maintenance of an adequate and easily regulated supply of cooling water to the cylinder jacket of an internal combustion engine is a vital point if the most economical conditions of running are to be obtained.

"Heenan" Mechanical Coolers have been in use in India for the last ten years and the latest designs make mechanical water cooling hardly more expensive than good tank cooling for engines over 25 B.H.P.

Two designs are offered, *viz.*:

The "K" Type, illustrated above, for engines up to about 160 B.H.P.

The "V" Type for larger engines and groups of engines.

Advantages of the "Heenan" Type Cooler.

1. **Low initial cost.**

(For an engine over 20 B.H.P. the Cooler is cheaper than good tanks.)

2. **The continuous cooling enables runs of any length to be made without overheating.**
3. **Economy in floor space.** (See diagram on page 536.)
4. **The cooling system can be placed in the engine house thereby bringing the whole under the direct supervision of the driver.**
5. **Improved circulation and resultant engine economy.**
6. **Economy of water in districts where clean water is scarce.**

Not least of the advantages gained by the adoption of the "Heenan" Mechanical Cooler is that of a constant temperature for the circulating water which results in economy in fuel consumption and less rapid wear of the engine due to overheating and consequent pre-ignition troubles. The great disadvantage of tank cooling system is that generally the circulating water is too cold at the start and hotter than it should be at the end of a day's run.

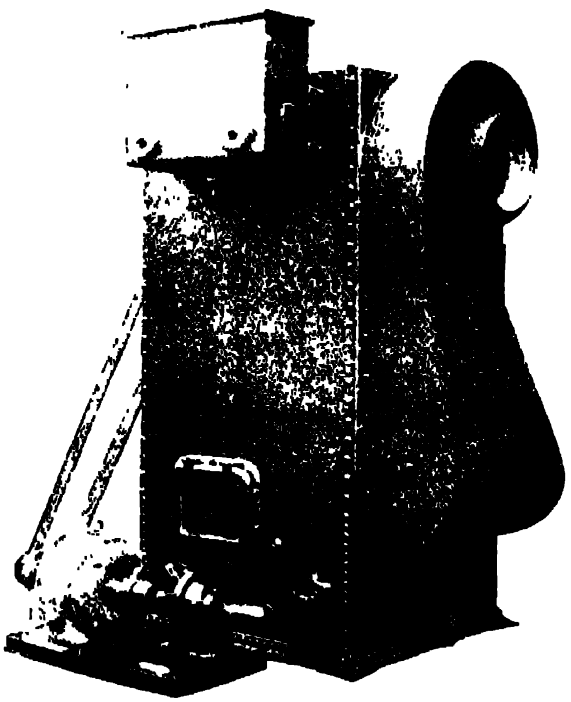
We regularly stock several sizes of these Coolers.

Description of "K" Type Cooler.

The apparatus consists of a cast-iron casing in which two metallic wool screens are fitted vertically one behind the other, the cooling effect being obtained by distributing the hot water over these screens, and at the same time forcing a current of air through them by means of a Propeller Type Fan bolted to the front of the casing. The hot water from the engine jackets is delivered to a trough formed in the top of the casing, and after passing through a detachable strainer is evenly distributed over the screens through perforated brass plates, fitted in the bottom of the trough. The cooled water collects in the base of the Cooler, from whence it is re-circulated to the jackets by means of a small circulating Pump which, in the case of sizes Nos. 1, 2 and 3, is of the positive gear type and of the centrifugal type for size No. 4. This Pump is bolted to the Cooler casing.

A simple form of Eliminator is fitted to the air discharge side of the Cooler to prevent loose moisture leaving the machine, the blades being mounted *en bloc* in a separate framework immediately inside the Cooler outlet. The Eliminator is easily removable so that access can be gained to the make-up ball float valve when adjustment of this is necessary.

The makers have standardized a belt-driven Fan, the Pump being also belt-driven from a second pulley keyed to the Fanshaft, but as an alternative the Fanshaft can be direct-coupled to a small Electric Motor whenever this arrangement is preferred by Constituents.



Heenan Coolers in India (for Oil Engine Cooling).

Military Works Department—Power Station at Allahabad Fort.

Military Works—B I Barracks, Lahore.

Jullundur Electric Supply.

Motor Transport Workshop—Chaklala.

Messrs. Jardine, Skinner and Co.—Patna Electric Supply.

Messrs Barry and Co.—Several Tea Estates.

Messrs. Begg Dunlop and Co.—Several Tea Estates.

Messrs. Williamson Magor and Co.—Several.

Sarda Canal Workshops—Bareilly.

Lower Chenab Canal Power Station, etc., etc.

Messrs. The North-West Soap Co.

Messrs. Choudhuri and Co.—Raneegunge Works.

Numbers of "Heenan" Coolers have also been supplied for cooling the circulating water of refrigerating systems and for air cooling for large electric generators.

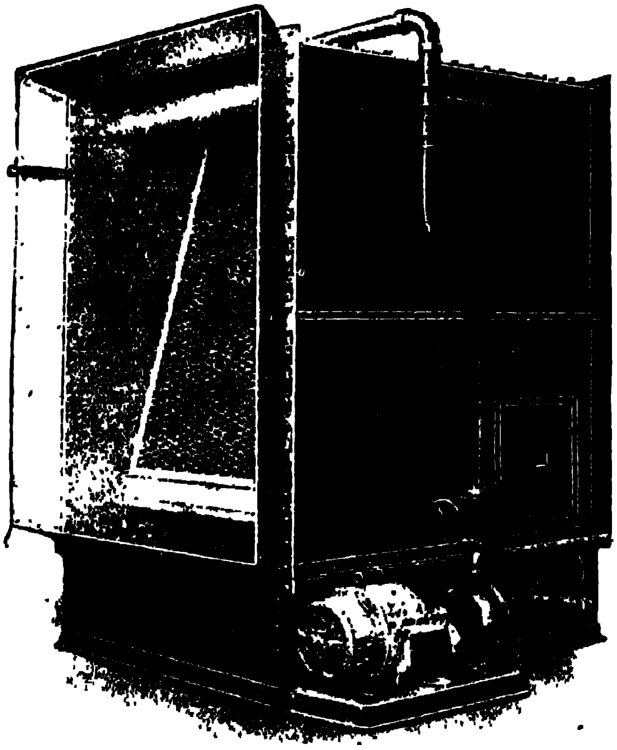
Larger "Heenan" Coolers.

The illustration on this page shows the Heenan "V" Type Cooler which is constructed in single units for cooling circulating water in engine up to 6,000 B.H.P. We shall be pleased to send separate descriptive lists on these Coolers and to quote prices. Similar Coolers can be offered for oil cooling as required in the Tool Rooms of modern Works.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, | JESSOP & CO LTD ENGINEERS | RANGOON, MADRAS, BOMBAY, LONDON.

The "Heenan" Patent Stationary Air Filter.

(Jessop and Co., Ltd.—Sole Agents.)



An "**Air-filter**" is a necessary adjunct to all modern power stations involving large Turbo-Alternators and may be either of the wet or dry air type. The requirements of a good filter are, that the supply of air to the alternators shall be clean and cool: **Clean,** so that the small ducts through the stator core shall not become clogged with the myriads of small particles of dirt always present in the atmosphere especially in industrial districts. **Cool,** so that the effective output of the alternator may be maintained within the permissible limits of temperature.

The wet type of filter ensures the cleanest air but probably the greatest difficulty to be

the

the

winding, destroy the insulation and cause a severe burn-out. This difficulty is definitely overcome by the "Heenan" Patent Filter which entirely avoids the use of Sprays or similar apparatus for saturating and cleaning the air to be filtered. A special feature of this machine is that the resistance does not increase with the length of time the apparatus is in service but remains constant throughout.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

The "Heenan" Stationary Air Filters.

Construction.

The illustration shows that the body of the Filter is rectangular in shape, built up of steel plates stiffened where necessary with angles, and suitably mounted on a substantial base the latter forming a tank. The filtering effect is obtained by drawing (or forcing) the air through two sets of screens fitted one behind the other, in the front part of the Filter; these screens being formed of metallic wool of standard size and thickness, held together between frames of heavily galvanised expanded metal.

To ensure that the air is thoroughly cleaned, a flow of water is continually passed over the screens, being maintained by a small Centrifugal Pump, fitted at the side of the Filter, which delivers the water to the top of the screens. The water, after percolating through the screen, falls into the tank at the bottom of the Filter, where it passes through a strainer and returns to the pump to be re-circulated.

The screens are quite accessible and easily removed for cleaning purposes, but experience shows that this is seldom necessary, owing to the fact that they are continually washed with water the dirt, etc., being carried with the water to the bottom of the Filter, whence it can be removed through sludge doors.

The air after passing through the screen, passes a series of fixed Eliminators, fitted at a suitable distance from the screens, which catch any small particles of loose moisture that may have passed the second screen. The total resistance to passage of air through the machine does not exceed 0.75 ins. water gauge.

In addition to cleansing the air, this process, of course, has a great cooling effect, reducing the temperature of the air to within a few degrees of the prevailing wet bulb temperature and experiments have shown that the danger of loose moisture being carried into an Alternator is eliminated entirely in this type of Filter.

The water level in the base or tank is maintained by an ordinary float valve connected to the water supply, the amount of water used being the amount lost by evaporation in passing through the Filter.

These machines have been designed in some 13 standard sizes, ranging in capacity from 1,300 to 75,000 cu. ft. per minute, and we have no hesitation in saying that up to the present no apparatus has been put upon the market which can give such consistent and satisfactory results.

The advantages of this type of Filter are summarised as under:—

1. High cleansing efficiency.
2. Positive cooling effect.
3. Cleansing and cooling are effected by water washed surfaces and not by sprays.
4. Entire freedom from loose moisture.
5. Simplicity and lack of necessity for highly skilled attention.
6. Accessibility of all parts.
7. Durability owing to small number of moving parts and to the material (Phosphor-Bronze) used for filtering surfaces.
8. Reliability.
9. Small space occupied.
10. Absence of danger from fire.

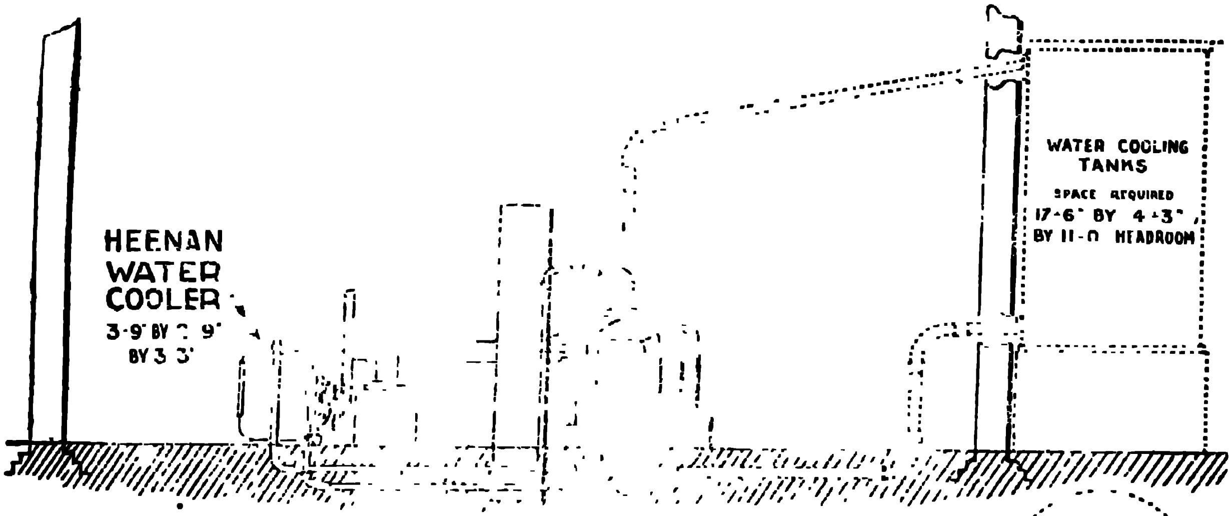
We shall be pleased to furnish further particulars and estimates to meet any requirements.

We can also draw up schemes for conditioning air in Cotton Mills, Breweries, Explosive Factories, etc., where particular atmospheric conditions are essential to obtain best results. In order to deal with such [illegible] the fullest information is necessary and enquiries must be accompanied with accurate [illegible] of factories and works.

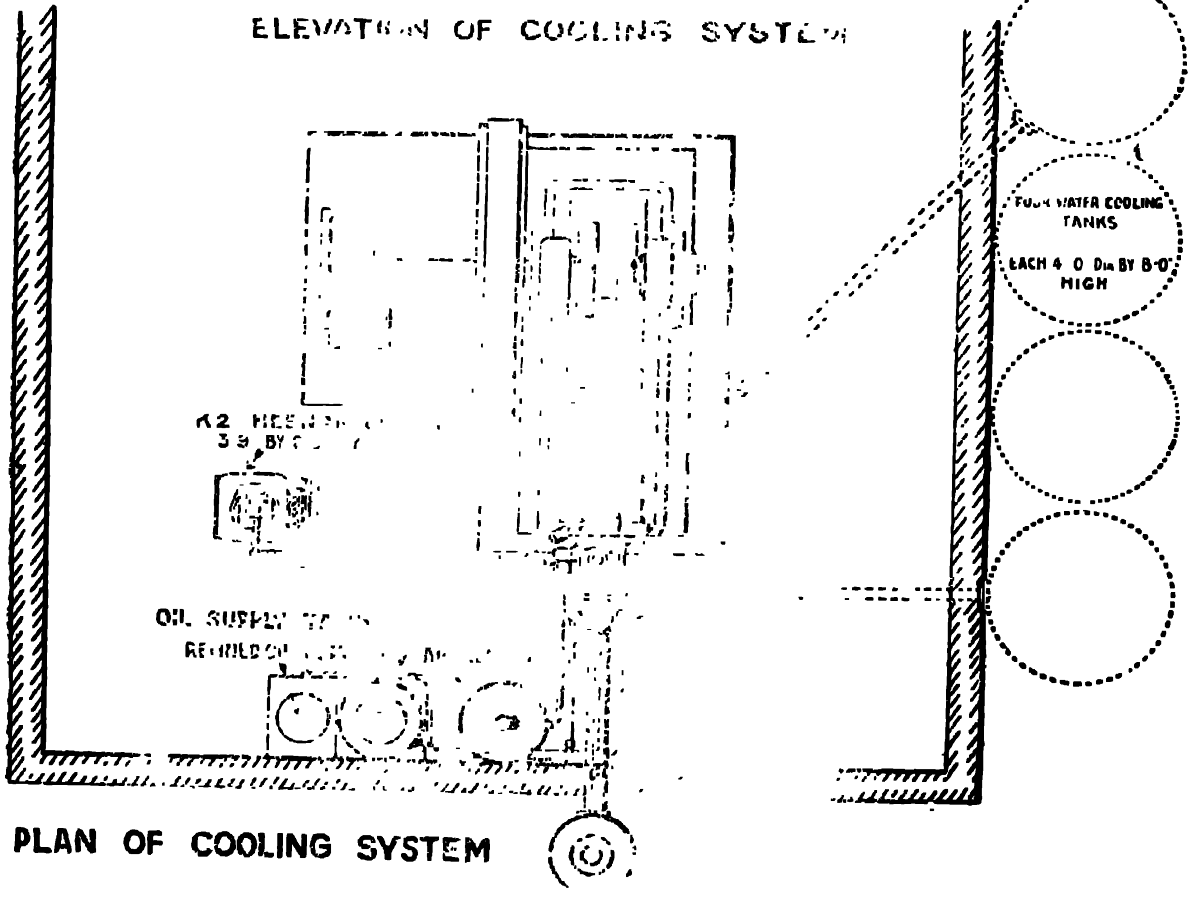
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



ELEVATION OF COOLING SYSTEM



PLAN OF COOLING SYSTEM

We illustrate above a typical water cooling lay-out for a 50 B.H.P. Oil Engine which shows accurately to scale the relative space taken up by a "Heenan" Cooler and a system of tanks of suitable capacity for an engine working ten hours daily in a tropical climate. It should be noted that the Mechanical Cooler requires smaller pipes to connect to the engine than is necessary to obtain a free circulation with a tank system.

MACHINE TOOLS

AND

WOODWORKING MACHINERY.

WE are Agents for and carry stocks of Machine Tools by the following well-known British Machine Tool makers :—

A. A. Jones and Shipman, Ld.	Leicester.
Smith Barker and Willson, Ld.	Halifax.
Scott Bros. (Halifax), Ld.	Halifax.
F. Towns and Sons, Ld.	Halifax.
Ormerod's Tool Co., Ld.	Hebden Bridge.
Summerskill Bros.	Sowerby Bridge.
Denham's Engineering Co., Ld.	Holmfield.

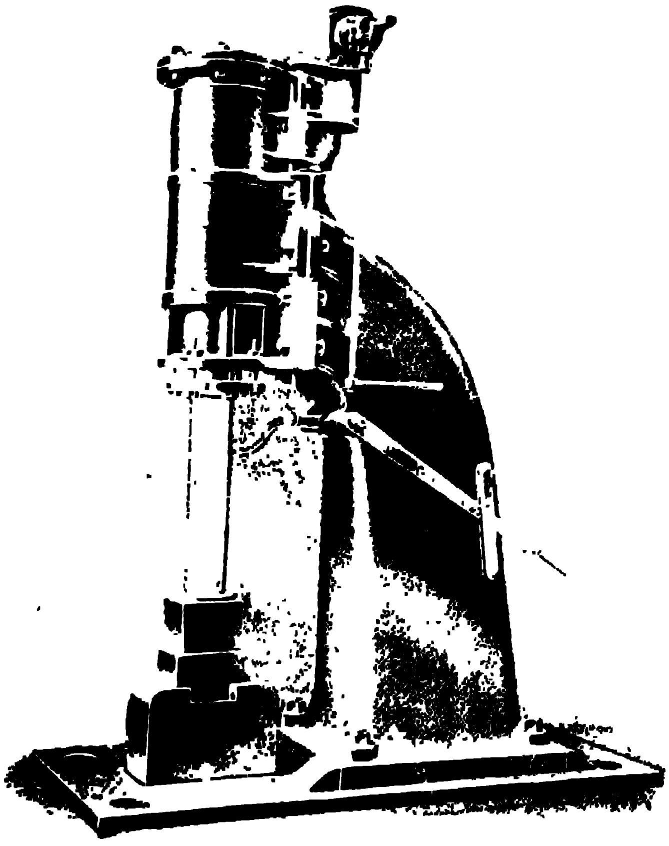
Etc., Etc., Etc.

The Machines illustrated are almost without exception made by the above well-known makers to designs which have been greatly improved during recent years and this fact should be noted in making comparisons of prices.

We have a skilled technical staff always ready to advise constituents on the most suitable types of machine to use for particular or general work, and to draw up estimates and plans for general workshop lay-outs. We are also prepared to send demonstrators when necessary to show buyers how to obtain full capacities from machines supplied.

We shall be obliged if prospective buyers will write to us should they not find the exact machine they need illustrated on the following pages.

Improved Steam Hammer.



Fig

This illustration represents the general appearance of a Steam Hammer for medium size Smith work and has its column, sole-plate, anvil block and cylinder in separate castings. The cast steel hammer head is bored out and fitted to a suitable taper on the piston rod end. The piston rod is flattened to prevent turning and works through special gun metal bushes and gland machined to take the flat. The hammer head is of cast steel. The sole plates have double ribs to strengthen them and take up side thrust.

These Hammers are designed for working pressures up to 80 lbs. per square inch and are complete with all the latest improvements and fitted with lubricator plug cocks, etc., and with balanced slide valve.

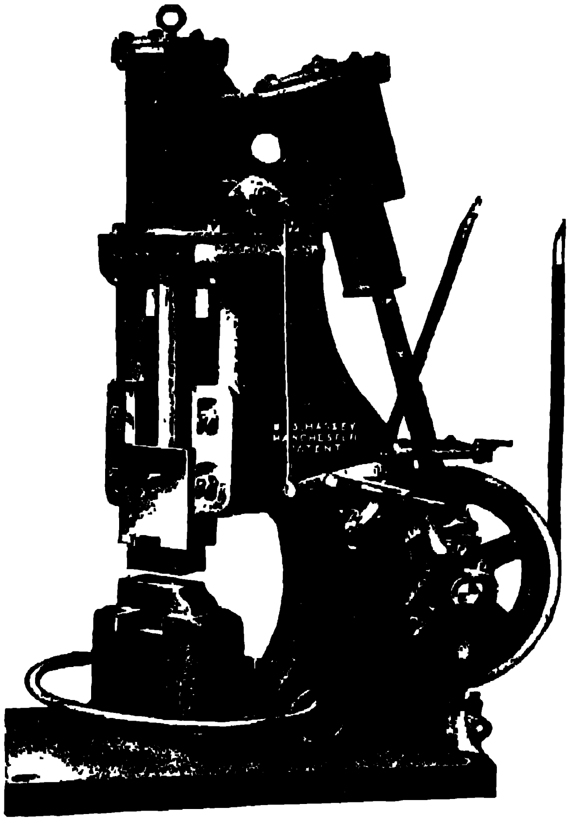
Size	Dia of Cylinder	Stroke	Appro Weight complete	Dia of Piston Rod	Height of Hammer	Floor space occupied	Dia. of Steam Pipe	Dia of Exhaust Pipe	Price
Cwt.	Ins.	Ins.	Cwt.	In.	Ins.	Ins.	Ins.	Ins.	Rs.
3	9	20	60	4½	105	75 × 42	2¼	3¼	3,345
4	10	22	70	4¾	105	75 × 42	2½	3¼	3,825
5	11	24	95	5½	122	90 × 45	3	4	4,540
6	12	24	105	6	122	90½ × 45	3	4	4,780
7½	13	26	125	6½	132	94 × 45	3	4½	5,735
10	14	30	180	7½	144	101 × 48	3½	5	7,405
12½	15	30	210	7½	144	101 × 48	3½	5	8,125
15	16	36	270	8½	171	132 × 58	4½	7	11,470

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Pneumatic Power Hammers.



Belt Driven.

Pneumatic Power Hammers were originally introduced with the idea merely of meeting cases in which the introduction of Electric and Gas Driving made it desirable to dispense with the use of steam altogether, and in which it was therefore necessary to find some efficient and convenient substitute for Steam Hammers.

They have, however, proved so satisfactory that they are now most successfully used, in many places even where steam is also available.

Capacity. They are quite **as powerful as Steam Hammers** of equal falling weight used with a steam pressure of about 60 lbs. per square inch. Stroke equally long.

General Construction. The Pump is driven by means of a forged steel Crank and Connecting Rod. A **Driving Pulley,** which is also a heavy **Flywheel,** is mounted on the crankshaft, and is placed low down **within the** standard, thus making the Hammer steady and compact.

The Piston and Piston rod are forged in one solid piece, and the lower end is accurately fitted into a taper hole in the Tup.

The Pallets are Tough Steel Castings dovetailed into position. The Anvil block being diagonal is accessible from any position.

The Base-plate is solid with the standard in the 7 cwt. and smaller sizes, and bolted thereto in the larger.

Lubricator.—A patent Pump Lubricator is supplied enabling all parts to be lubricated from below while same is working.

Regulation.—The Hammer is under **perfect control. Heavy** or **light blows** can be struck at will, the regulation being **easy, accurate,** and **instantaneous.**

Foot Lever.—Hammers up to, and including the 7 cwt. size, are provided with Foot Lever in addition to Hand Lever, enabling the Hammer to be **controlled by hand or foot.**

Speed.—Hammers must be run at speeds listed, as they are tested and the valves are regulated to suit these speeds, and they will, therefore, only give the best results when run accordingly.

Size (Weight of Falling Parts) Cwt					10	15
Dimensions :—						
Longest stroke	14	17		24		30
Clear space between slides	7	8½		11¼	12¼	14
Size of tup pallet face	6¾ × 4½		10 × 6	11 × 7	12 × 8	13 × 9
Height of anvil face	2¾					
Anvil Pallet face to slides ins.	8½	11½		15		18¾
Driving Pulley diameter and width	30 × 3	30 × 4	36 × 5	42 × 8	48 × 10	
Revolutions per minute	200	160	140	120	110	105
Size of base-plate		4½ × 3	5 × 3½	5½ × 3¾	7½ × 4¼	8¼ × 5
Diameter of bar worked efficiently .. ins.	3	4	6		8	
Approx. gross weight tons	2¾	4	6¼	7¾	11¾	

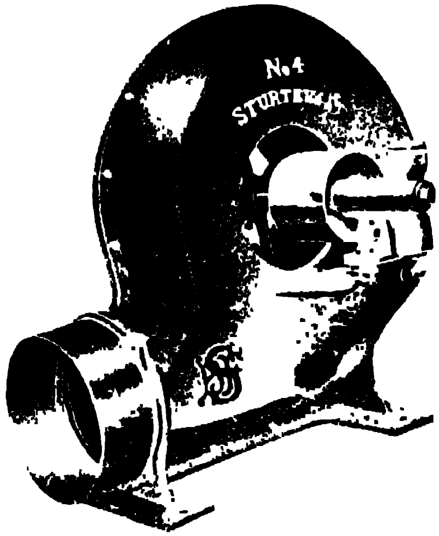
Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sturtevant Low and High Pressure Fans.



"Monogram" or Low Pressure Fans are designed for general industrial purposes, where large volumes of air have to be delivered against considerable resistance.

"Monogram" Fans are made either "Right" or "Left" hand, defined by the relative position of the pulley.

They are used for blowing forge fires, brazing forges, gas irons, puddling, re heating, case hardening and annealing furnaces, for the ventilation of mine galleries and tunnels of ships' magazines, and all purposes where large volumes of air at considerable pressure are essential.

The table given below shows the ordinary speeds for blowing forge fires and the total tuyere area in square inches, which each size of Fan will feed with a properly designed system of blast piping.

High Pressure Fans are designed and extensively used for blowing cupolas, also for certain classes of work such as ventilating the faces of workings in mines, for pit sinking, etc., in which a much higher air pressure is required than can be economically obtained by fans designed for general industrial purposes.

The following table gives the average melting capacity of the different sizes, determined from numerous examples of actual working. They represent the results ordinarily attained in good modern cupolas with a melting bed of average composition, good foundry coke and air-tight blast pipes of sufficient size constructed with easy bends.

Particulars of "Monogram" or Low Pressure Fans.

No. of Fan	Outside Diam. of Discharge Nozzle*	Key Diam.	Key Face	Air Pressure Inches Water Gauge	Speed	No. of Forges Blown 1¼" Tuyeres†	Tuyere Area Blown in sq. in.	Horse	Price
	In.	In.	In.		R.P.M.				Rs.
			1⅞		4,800	3			96
					3,600	9	11		180
					3,400	14	17		240
					2,700		26		300
	10⅞				2,400	27	33		365
	12				2,050	37	46		515

*Or inside diameter of pipes which slip over discharge nozzles.

†In forges having tuyeres larger than 1¼ ins. diam. or more than one tuyere, the number of forges blown will be proportionately less.

Particulars of High Pressure Fans.

No. of Fan.	Melting Capacity	Usual size of Cupola with this Fan. Int. diam.	Speed of Fan	Air Pressure Inches. Water Gauge.	Horse Power.	Price
	Tons per hour	Ins.	R.P.M.			Rs.
1	¾ to 1¼	16	4,700	12	2½	350
2	1¼ to 1¾	18	4,100	12	3¾	435
3	1¾ to 2½	20	3,700	14	5¼	550
4	2½ to 3½	26	3,200	14	7½	750
5	3½ to 4½	29	2,900	16	12	950
6	4½ to 6	35	2,750	16	15	1,450

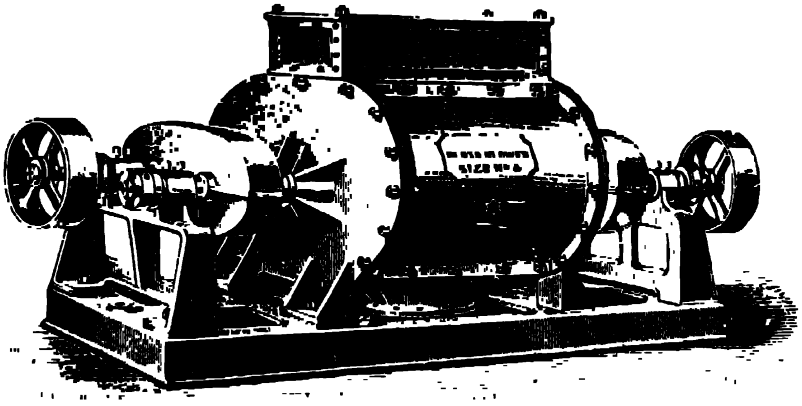
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

New Pattern Roots Blower.

For Belt Power.



General Specification.

The Blower Cylinder is made of cast-iron, strongly ribbed where necessary, planed on meeting flanges and accurately bored the whole length of the cylinder. The Revolvers are of tough cast iron, accurately machined all over the outside to the correct radii, faced on ends and bored to receive the steel shafts. The shafts are made of Bessemer Steel, machined all over. Gear wheels are machine cut from solid blanks. Cast-iron Gear Covers made in two halves form an oil bath for the wheels to run in. The Bedplate is substantially constructed. The taper ended bearings are a special feature of these Blowers. All sizes from No. 3 and upwards are fitted with outside bearings, that is, a bearing outside of the gear box and up against the driving pulley. This arrangement effectually prevents the tendency to bend the shaft.

All Blowers are carefully tested before leaving the works.

Air Pressure.—The Air Pressure at the Blower usually allowed for medium size Smithies is 14-inch water gauge (½ lb. per square inch) and for Cupola work, 21 inch water gauge (¾ lb. per square inch).

Escape Valve.—An Escape Valve should always be used when the Blower is used for Smithy fires.

Directions for Erecting supplied with each Blower.

Particulars.

Size No.	C. Ft. of Air per minute	Maximum Revolution per minute	Number of Smith's Fires Blown 1¼ in. Tuyeres	Tons of Metal melted per hour	Diameter of Outlet in inches	B.H.P. for ½ lb. Pressure for Smiths' Fires.	B.H.P. for ¾ lb. Pressure for Cupola work	Price. Rs.	A.
1	1,300	400	13	2	7	3½	5	1,575	0
2	2,000	400	20	3	8	5	7½	2,050	0
3	3,000	380	30	4	10	8	12	2,600	0
4	4,690	350	50	7	12	14	20	3,600	0
5	6,400	320	70	10	13	18	25	4,525	0
6	8,680	310	90	15	17	23	34	5,700	0

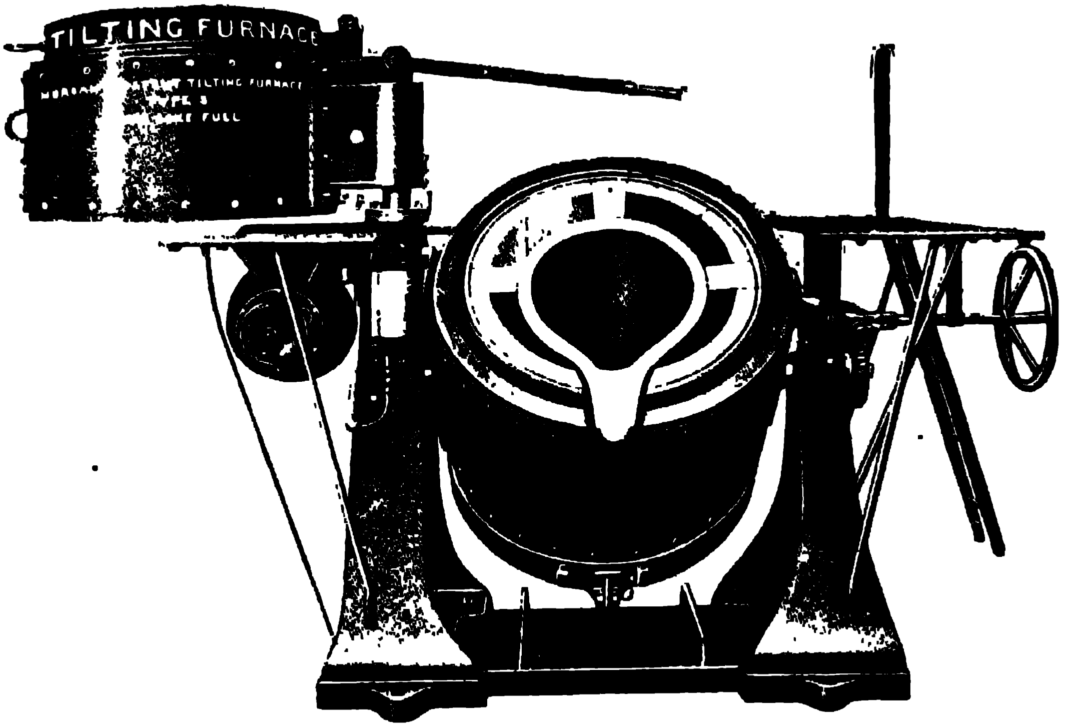
Blowers with bottom discharge bend and escape valve are supplied unless otherwise ordered.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Morgan's Patent Tilting Furnace.
Type "S" for Coke.



Pouring Position of Furnace.

The Type "S" Furnaces are made in 6 sizes to take Salamander Crucibles of from 150 lbs to 1,200 lbs. capacity for melting copper, brass, bronze, gun-metal and other alloys, aluminium, etc., in the smaller sizes for melting cast-iron, and the more refractory qualities of iron, acid-resisting metals, etc.; two sizes are specially made for use in steel foundries for melting Ferro-manganese and similar alloys.

The body of the furnace is composed of two light steel shells, both of cylindrical form and lined with Battersea Refractory Bricks The incoming air passes between the walls into the ashpan, below the grate bars, whence the necessary supply reaches the fuel chamber through tuyere holes in the refractory lining, and also through and over the grate bars. The outer shell is kept cool by the passage of incoming air.

The grate bars are of special design; the two side sections being made to hinge may be lowered to enable the slag and clinker to be easily cleared from the furnace.

The crucible is surmounted by a muffle ring, which fits closely on to it, the muffle ring being heated solely by the radiation of heat. The furnace gases do not come into contact with the molten metal, and by placing a cover on the muffle ring even the most volatile metal or delicate mixtures can be melted free from the oxygen of the air and from any risk of absorbing sulphur and impurities from the fuel.

The preheater section is formed of a steel shell lined with Battersea Refractory lining, and serves to collect the gases of combustion which are utilised to melt the metal contained in the muffle ring.

When raised by the cam the preheater section pivots on the spindle on the side stand, and when swung off, the crucible is left accessible for skimming and pouring. The top cover makes a sliding joint with the preheater section, and is easily moved as far as may be required for working the furnace re-coking, skimming, adding the mixing metals, or stirring, without allowing the escape of an undue amount of heat.

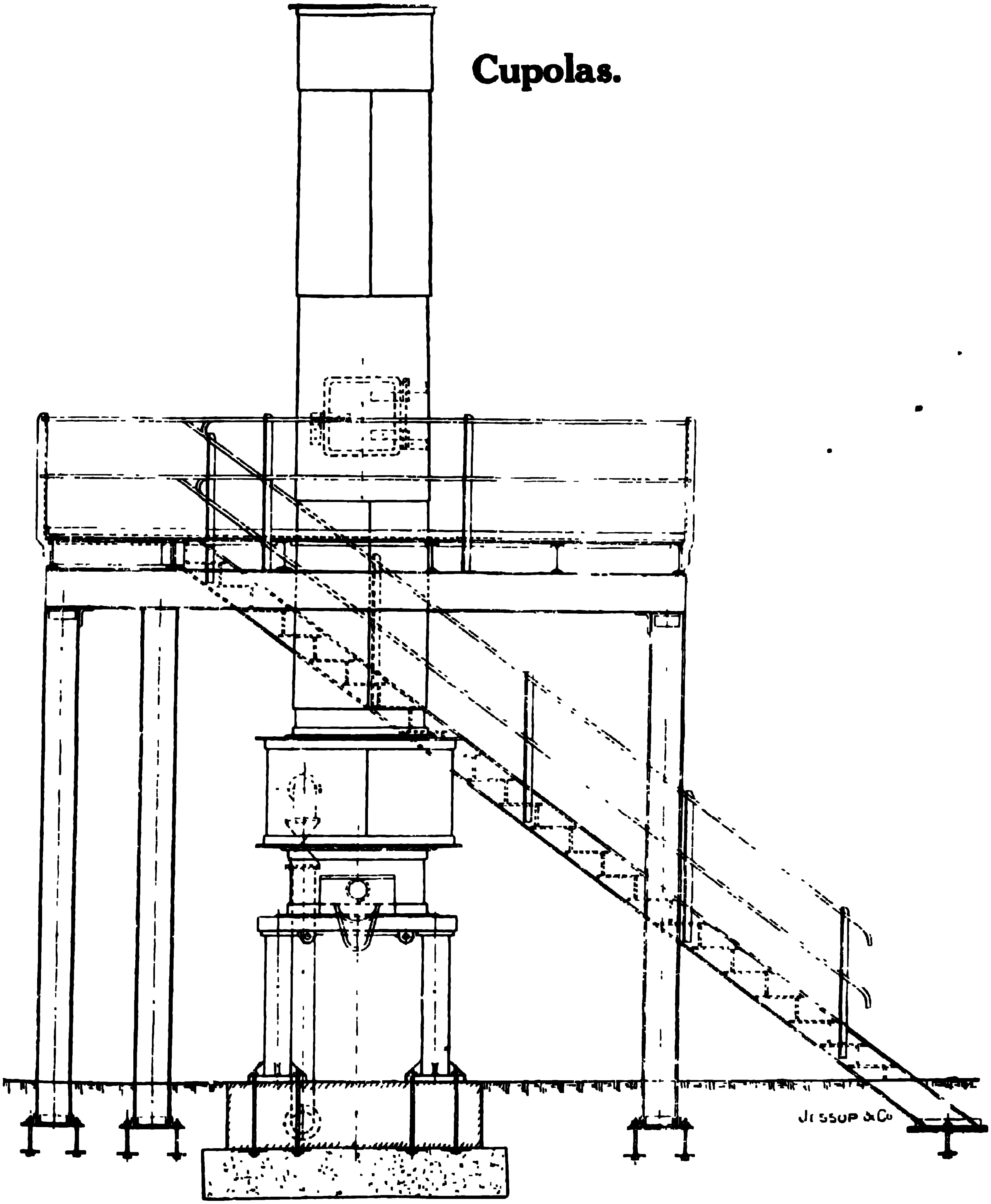
Full particulars and prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Cupolas.



The above illustration shows a modern type of Cupola with Drop Bottom and Cupola Staging from which the Cupola is fed.

We have made several Cupolas and Stagings recently, as shown on this illustration, of varying capacities, for Government and for private enterprises.

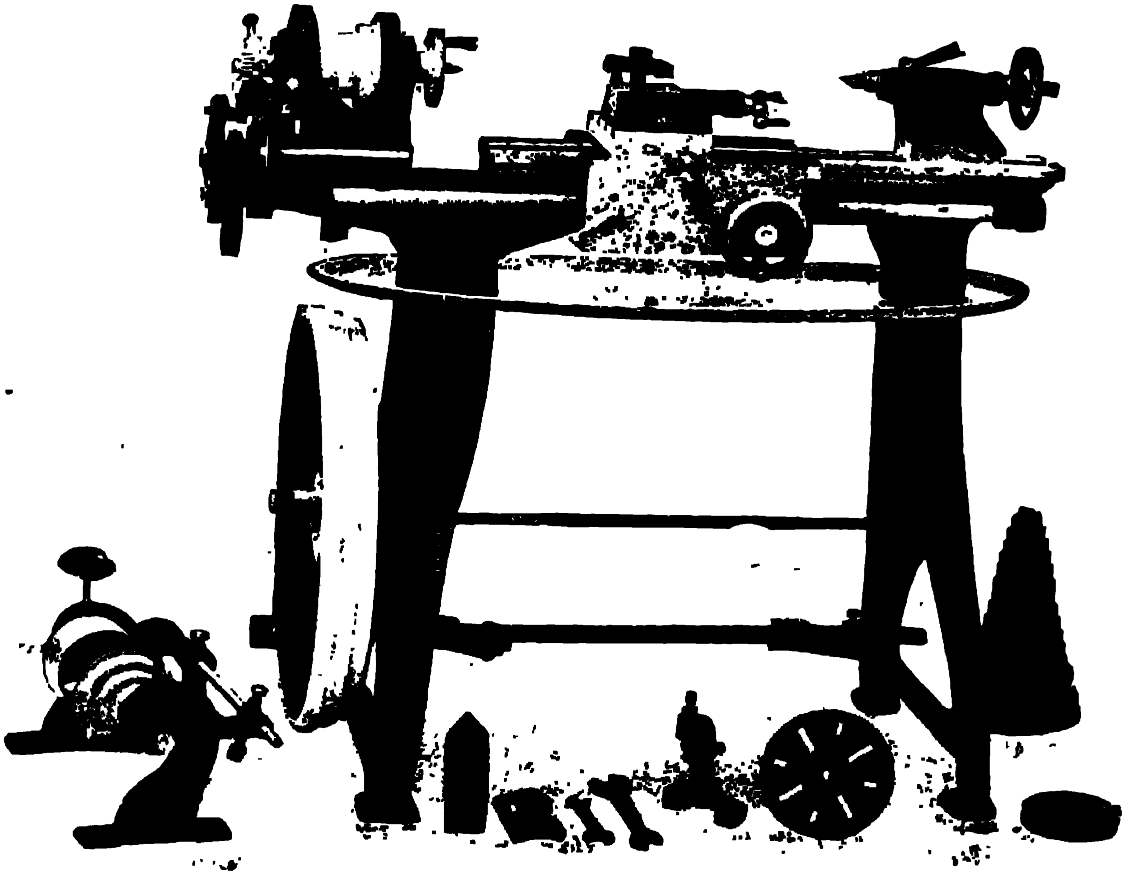
We also make Cupolas with a Metal Receiver in front, if desired.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Britannia" Screw-cutting Back-geared Foot or Power Lathe.



4⅛" centre by 3′ 6" Gap Bed Self-acting, surfacing, sliding and screw-cutting.

The Bed is of vee design, and of ample width and surface It is of a heavy box section with a short gap

The Headstock is of rigid design, back-geared and fitted with either adjustable ball thrust bearings or concentrically adjustable bronze bearings of large diameter.

The Locse Headstock is of the solid pattern, graduated, and arranged to set over for taper turning

The Saddle is of large dimensions, accurately fitting the bed, and is provided with a boring carriage having a number of "T" slots for holding down work A large apron is fixed to the saddle completely protecting the leading screw

The Slide Rest is fully compound, with balanced feed handles, and can be bodily lifted from the boring table by removing four nuts

The Leading Screw is of large diameter, cut with a square thread of guaranteed accuracy.

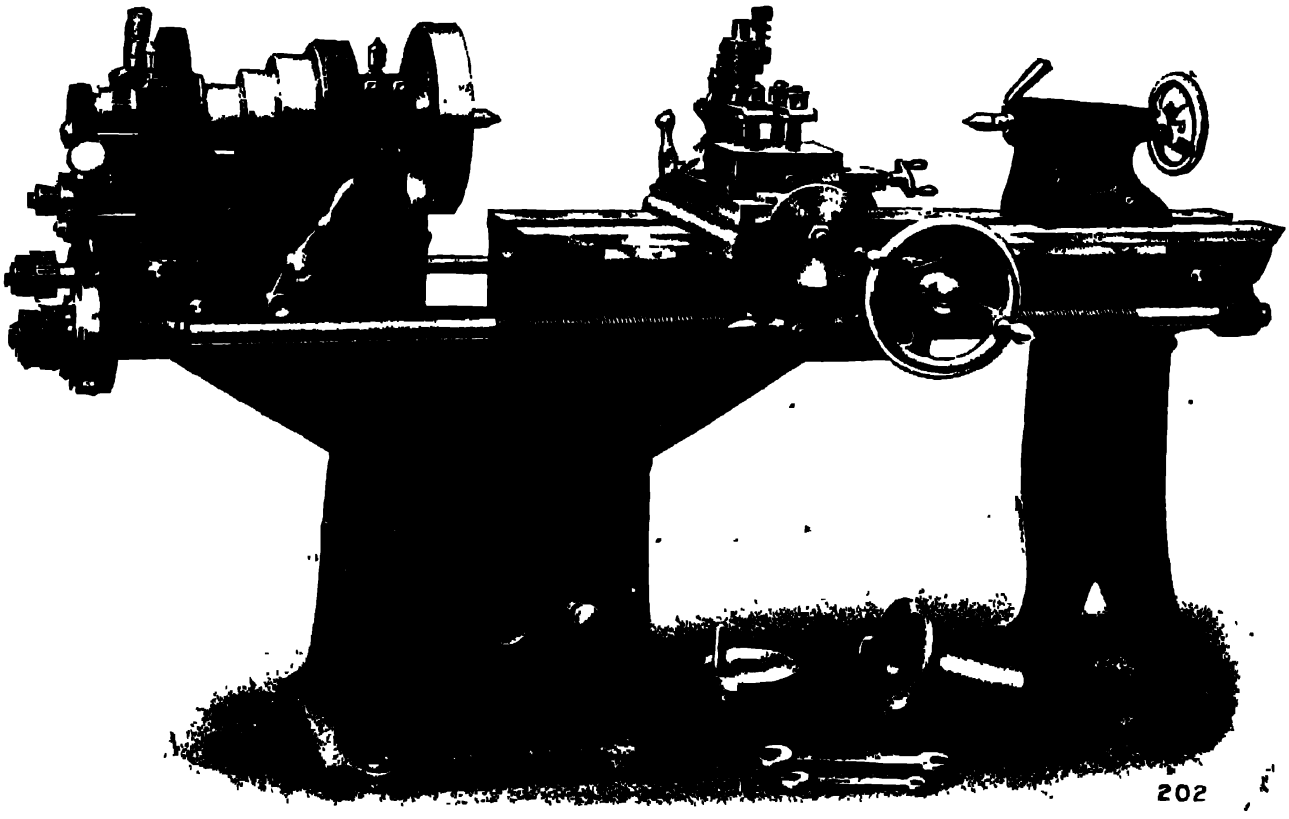
The Treadle Motion is entirely self-contained in legs, the flywheel which runs on ball-bearings being of exceptional diameter and weight

The Accessories comprise full set of 16 Change Wheels to cut all standard Whitworth threads from 1 to 60 per inch, face plate, driver chuck, travelling steady rest, pair of plain centres, driving belt. and spanners

Dimensions.

Height of centres ..	4⅛"	Diameter of Cones	4¼", 3⅝", 2½"
Takes between centres	25½"	Diameter of Flywheels ..	24", 23⅛", 22⅝"
Swings in Gap	11½"	Diameter of countershaft	
Length of Gap	4⅛"	Pulley	4⅞" by 1½"
Swings over saddle	7¼"	Countershaft speed ..	300
Length of Bed	3′ 6"	Diameter and pitch of leading	
Length overall	3′ 9½"	screw	1" by ¼"
Breadth overall	2′ 1"	**Weight** (approx.) ..	4½ cwt.
Diameter of hole through Mandrel	1⁄16"	**Price** ..	**Rs. 900**

6½-in. Centre Self-acting, Sliding, Surfacing and Screw-cutting Lathe.



The Bed is of improved design fitted with cabinet legs. **The Saddle** is fitted with quick hand traverse along bed by steel rack and pinion **The Compound Slide Rest** is accurately indexed in degrees, and is arranged to swivel for Taper Turning. **The Leading Screw** is of steel, accurately cut, and is gripped by double clamp nut. **The Fast Headstock** is fitted with large diameter spindle, and the front bearing is fitted with Ring Oiler. **The Reversing Gear** requires no screw key, and is quick and handy to change, and cannot slip out of gear. **The Carriage** is so arranged that it is impossible for the screwing and feed gear to be engaged at the same time. **All Gears** are machine-cut from the solid, the pinions being of steel. **The Sliding and Surfacing Motions to Saddle** are positive in action and cannot slip, a micrometer adjustment is fitted to the surfacing screw. **The Loose Head** is arranged to set over for Taper Turning **The Spindle** is ground on dead centres, and is fitted with Patent Ball Thrust Washer.

Accessories supplied with each lathe; adjustable travelling stay, face-plate, catch-plate, set of 22 machine-cut change wheels, overhead motions and full set of spanners.

Dimensions.

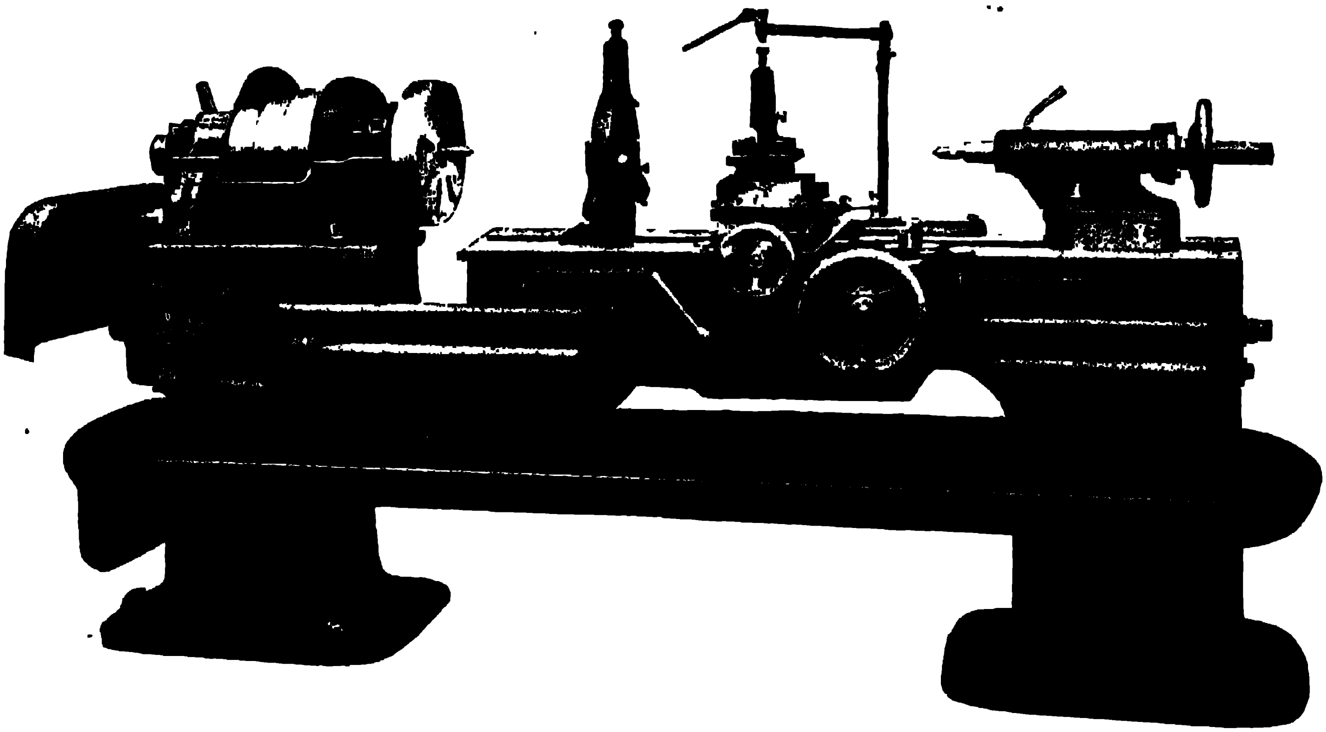
Height of centres	6½"	Driving cone- largest speed	8"
Length of Bed	6' 0"	Driving cone—smallest speed	4"
Admit between centres	3' 1"	Driving cone--number of speeds	3
Bed—Wide	9"	Ratio of Back Gear	6 5 to 1
Bed—Deep	7"	Number of spindle speeds	12
Swing over Saddle	10"	Countershaft Pulleys	10" by 2"
Swings in Gap, diameter	26"	Speed of countershaft	250 and 180
Swings in Gap, width	6½"	Dia. of leading screw	1⅜"
Hole through spindle	1$\frac{9}{16}$"	Approx. nett weight	15 cwts.
		Price	**Rs. 1,550**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

6½-in. Centre High-Speed Double-Geared Lathe.



The Bed is of strong box section and fitted with half gap piece Bed has square jibs for saddle and is accurately surfaced **The Fast Headstock** is very massive, with forged steel spindle of large diameter The thrust is taken by ball thrust washers. Centres are made with Morse taper ends. The gearing is totally enclosed **The Driving Cone** has three speeds, and back gearing which, with two-speed countershaft, gives 12 spindle speeds, 6 of the speeds are double-geared. **The Reversing Motion** for cutting right and left-hand threads and for sliding and surfacing is located in fast headstock and controlled by a lever **Headstock** has set-over poppet for taper turning; poppet is bored Morse taper. **The Saddle** has long bearing on bed, ensuring accurate alignment with centres and rigidity under the heaviest cuts **The Aprons** are of the double-walled type. **The Compound Slide Rest** is accurately indexed in degrees and is arranged to swivel for taper turning. **Micrometer** adjustment is fitted to the surface screw. **The Leading Screw** is of steel, accurately cut, and is gripped by double clamp nut of width at least double the diameter of screw. **The Sliding and Surfacing Motion** is of improved type, controlled by a lever, which controls a drop worm, and the engagement and disengagement is instantaneous. A safety device is fitted so that the feed motion and screw cutting motion cannot be engaged at the same time **Feeds.** Any number of feeds can be obtained, but the gear box gives three changes for sliding or surfacing, with a fourth change to screw-cutting and is arranged to provide suitable sliding feeds **The Gearing** is cut throughout, and where necessary the gears are of steel. Rack on bed is also of steel **Accessories.** Each lathe is supplied complete with face-plate, catch-plate, set of 23 machine-cut change wheels, including 127 tooth wheel for metric pitches, adjustable back stay, stationary stay, overhead motion, and set of spanners.

Dimensions.

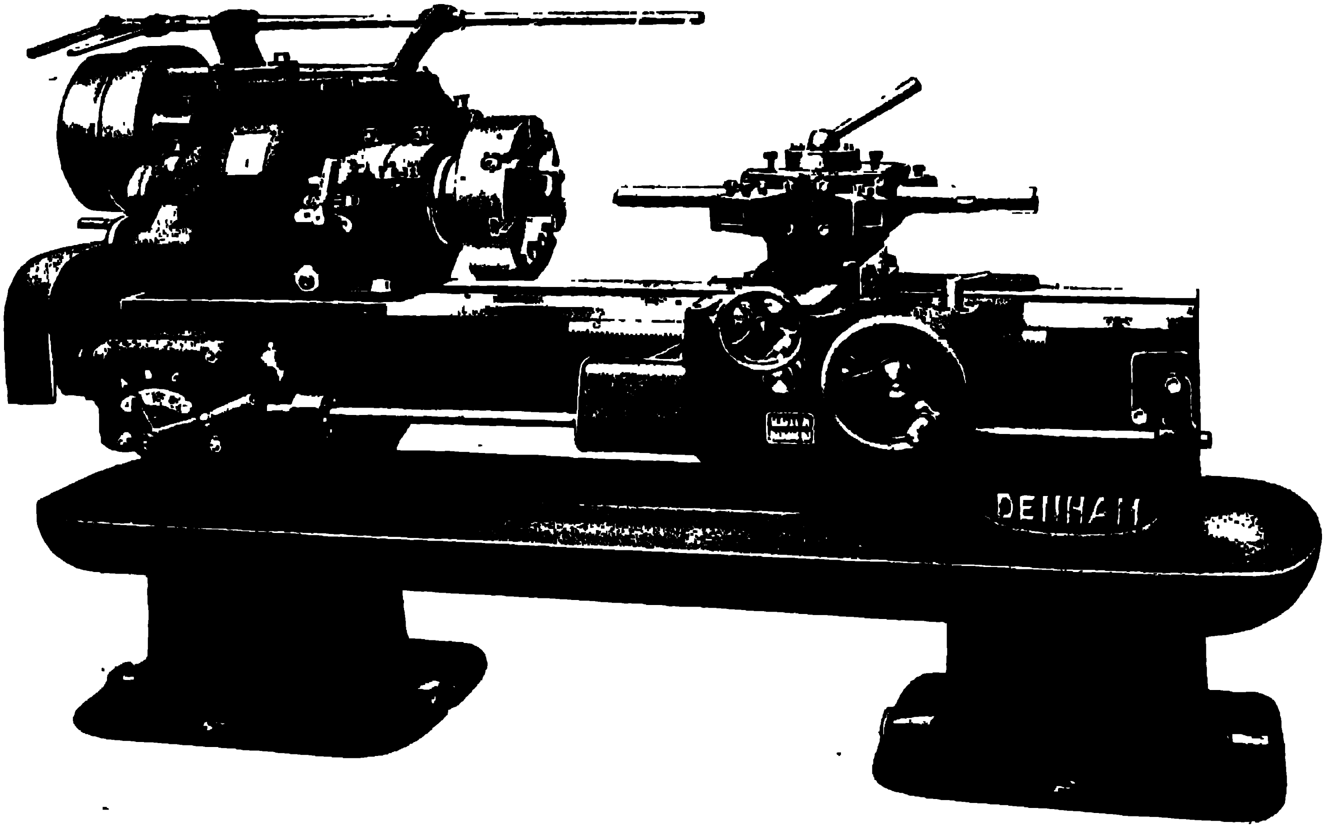
Height of centres	6½"	Swing in width ..	8'	Countershaft pulleys	14 and 9 by 3" belt
Length of bed ..	6' 0"	Hole through spindle	1½'	Speed of countershaft	290 & 110
Admit between centres ..	2' 9"	Ratio of double back gearing ..	6.5—1	Leading screw, dia.	1½"
Bed, width ..	11"	Range of spindle speeds ..	11.5—400	Floor space ..	7' 0" by 3' 0"
„ depth ..	8½"	Number of spindle speeds ..	12	Approx. nett weight	20 cwts
Swing over saddle ..	10"			**Price**	**Rs. 2,450**
„ in gap, dia. ..	2' 0"				

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

6½-in. All-Geared Headstock, Hexagonal Turret Lathe.



The illustration shows a 6½ in. Lathe, generally to the specification on the preceding page, but with a 6 ft. Straight Bed, All-geared Headstock and Hexagonal Turret.

The All-geared Headstock is built primarily for heavy duty but being very flexible is equally convenient for the handling of lighter work. The driving is through fast and loose pulleys followed by sliding steel gears with no idle running wheels, only gears doing duty being in mesh.

The Hexagonal Turret is mounted direct on the Cross Slide, having Power Cross Traverse on the Saddle for surfacing, but having Central Location on the Saddle by Removable Plunger when required for boring. The Turret is revolved by hand, being mounted on Ball Bearings, and the Turret Faces are located in position by Spring Plunger. The Standard Turret Tool Equipment includes:—3 Single and 1 Double Toolholders, snout type, 1 Boring Bar, 1 Drill Sleeve and a 4-Jaw Independent Chuck.

Dimensions.

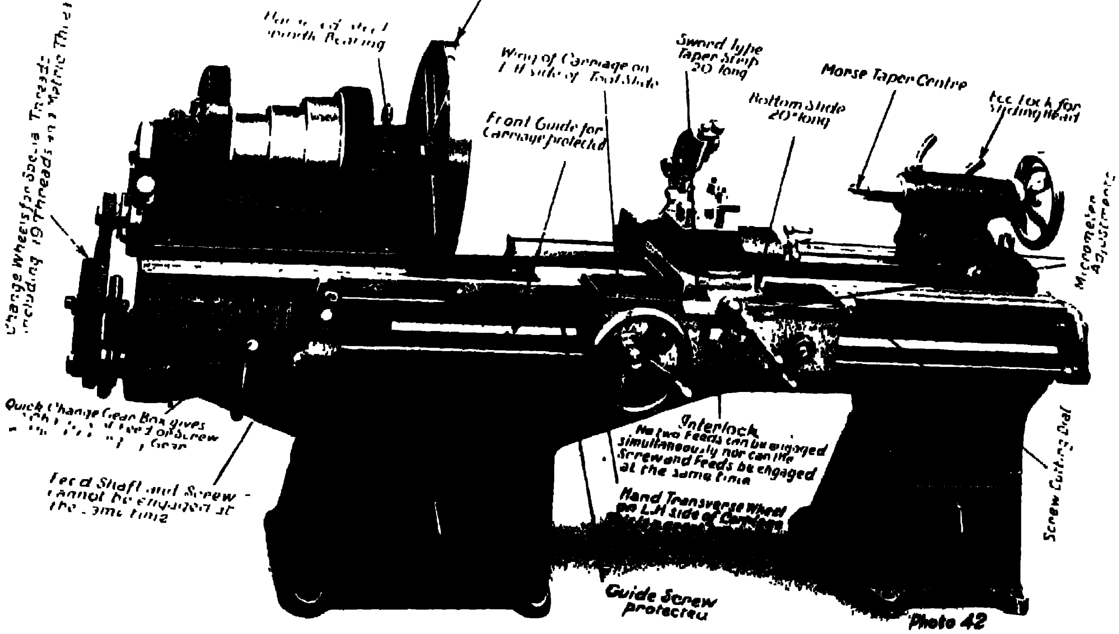
Height of Centres ..	6¼"	Distance between Turret Faces ..	9"
Length of Bed ..	6' 0"	Central Hole in Turret Faces ..	1¾"
Diam. of Driving Pulleys	14"	Max. distance between Chuck and Turret Faces	2' 3"
Speed of " "	300 R.P.M.	Diameter of Boring Bar .	1¼"
Width of Belt .	2¾"	Drill Sleeve Morse Taper ..	No. 4.
Hole through Spindle .	2⅝"	Section of Tool for Snout Holders	1" by 1"
Number of Speeds .	8	Approx. nett weight	21 cwt.
Range of Speeds, R.P.M	350 to 11	**Price, Gap Bed**	**Rs. 2,925**
Gear Ratio ..	27.5 to 1	**" Plain Bed**	**Rs. 2,885**
Turret Faces	**5¼" by 4½"**		

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

8½-in. by 8-ft. Willson Heavy Gap Bed Engine Lathe
With Quick-Change Gear Box.



Wrought steel Bearing
Wing of Carriage on L H side of Tool Slide
Sword type Taper Strip 20 long
Morse Taper Centre
Ecc lock for Sliding Head
Front Guide for Carriage protected
Bottom Slide 20" long
Micrometer Adjustments
Change Wheels for Special Threads including 19 Threads and Metric Threads
Quick Change Gear Box gives changes of Feed or Screw
Feed Shaft and Screw cannot be engaged at the same time
Interlock
No two Feeds can be engaged simultaneously nor can the Screw and Feeds be engaged at the same time
Hand Transverse Wheel on L.H side of Carriage
Guide Screw protected
Screw Cutting Dial

Photo 42

The Bed is of ample depth and width and is strongly braced by cross bars. The Feed Rack is of steel, accurately cut in one piece. **The Carriage** is very deep and approximates to an open box section, giving great stiffness and rigidity. The construction of the carriage also renders it possible to give all the Feed Shafts a bearing in the carriage. There is no loose **Apron.** All Gears and Guide Screw nut bear in the carriage itself. Both Feeds are engaged by a single friction of large diameter placed on the first motion shaft where it has the lightest work to perform. Only one feed can be engaged at a time. The change from longitudinal to cross feed or *vice versa* is accomplished by the movement of a sliding gear. Only when this gear is in the central position can the screw-cutting motion be engaged, as an interlocking lever placed underneath the carriage prevents motion of the nut unless the sliding gear is in the central position. Thus it is impossible to engage feeds and screw-cutting motion at the same time. **The Bottom Slide** is 20 inches long and is fitted with Sword Type Taper Strip. Both the **Cross Feed Screw** and the **Compound Rest Screw** are fitted with micrometer adjustments. **The Guide Screw** is placed close to the bed in a position between the tool and the guide strip. **The Quick-Change Gear Box** gives 12 changes of threads or feeds. The Gear Box is so arranged that the Feed Shaft and Guide Screw cannot be engaged at the same time. **A Screw-Cutting Dial** is fitted to side of carriage. **The Loose Head** is fitted with eccentric lock to bed. It is arranged to set over for taper turning. **The Fast Head** is fitted with 3-step cone. End Thrust is taken by Ball Thrust Washer.

Accessories supplied with each Lathe: 2-speed Countershaft, 16 ins. diameter Face Plate, Driving Plate, Sliding Steady, Change Wheels to cut 19 threads per inch and metric threads, Index Plate, Two No. 4 Morse Taper Centres and full set of spanners.

Dimensions.

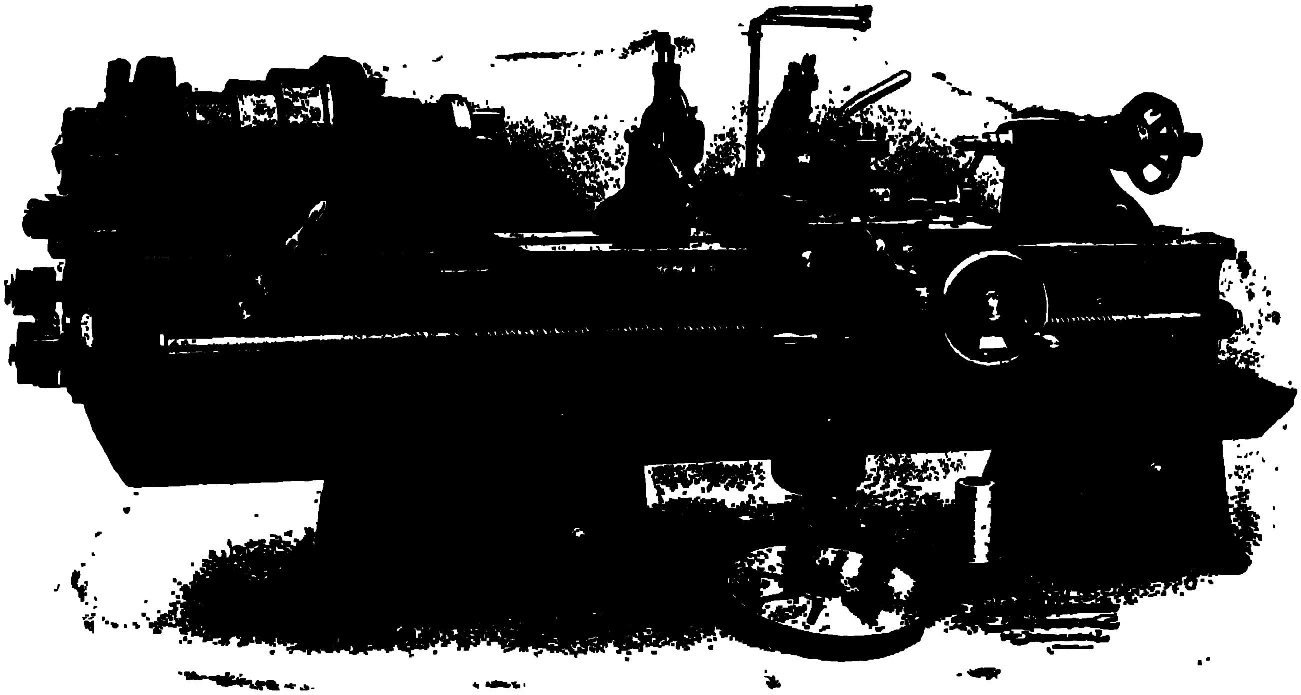
Height of centres ..		Ratio of Back Gears ..	8 to 1
Length of Bed ..	96"	Hole through Spindle ..	2⅛"
Width of Bed ..	16"	Diameter of Cones ..	12", 10", 8"
Depth of Bed at narrowest part ..	11"	Width of Belt ..	3¼"
" " " at Gap ..	18½"	Lead screws (4 threads per inch) ..	1½"
Swing over Bed ..	17½"	Cut Threads ..	1¾" to 96 per in
" over Carriage ..	10¼"	Feeds ..	3 times threads
" in Gap ..	24"	Countershaft Pulleys ..	12" dia.×6½" wide
Admits between centres ..	46"	" Speeds ..	350 and 110 R P M
Width of Gap ..	13"	Weight (approx.) ..	32 cwts
Admits in front of Face Plate ..	9¼"	**Price** ..	**Rs. 3,650**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

8½-in. by 8-ft. Centre High-Speed Gap Lathe.



The Bed is of improved Box pattern, cantilever form and mounted on two cabinet legs.

The Fast Headstock is fitted with large bearings ensuring long life and minimum amount of vibration under the heaviest of cuts and **the Spindle** is accurately ground on dead centres and has $2\frac{1}{16}$" hole through its entire length and is fitted with patent Ball Thrust Washers. **The Driving Cone** has three steps of large diameter and width and with back gearing and two-speed countershaft gives 12 speeds in geometrical progression. **The Saddle** has long bearing ensuring accurate alignment with centre and is arranged so that it is impossible for the screwing and feed gear to be engaged at the same time. **The Reversing Gear** is controlled by lever at back of headstock and cannot slip out of gear. **The Feed Motion** to saddle of which any number of feeds can be attained is controlled by lever in front of fast headstock, through a three-speed gear box, and is arranged to give suitable sliding feeds when the change gears are set for screw-cutting The surface screw is fitted with micrometer adjustment indexed in $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$.

The Loose Head can be set over for taper turning and is fitted with taper gib to take up wear. **The Gearing** is machine cut from solid and where necessary are of steel.

The Equipment includes face-plate, driving-plate, overhead motion, follow rest, stationary rest, oil pump, tray, tank and fittings, 22 change wheels and 127 tooth metric wheel and full set of spanners.

Dimensions.

Height of Centres ..	8⅝"	Swing in Gap, width ..	9"	Countershaft Pulleys	12" by 6½"
Length of Bed ..	96"	Hole through Spindle ..	$2\frac{1}{16}$"	„ Speed R.P.M.	35/110
Admits between Centres	50"	Ratio of Gearing ..	8.3 to 1	Width of Belt ..	3¼"
Bed, width	12"	Number of Spindle Speed	12	Diameter of Head Screw	1¾"
„ depth in Centre ..	13¼"	Cone Pulley, large ..	11¼"	Approximate weight ..	30 cwts.
Swing over Saddle ..	12½"	„ „ middle ..	9¾"	**Price,**	**Rs. 2,650**
„ in Gap, diameter	33"	„ „ small ..	7¾"	**Price,** without suds, pump or tray	**Rs. 2,475**

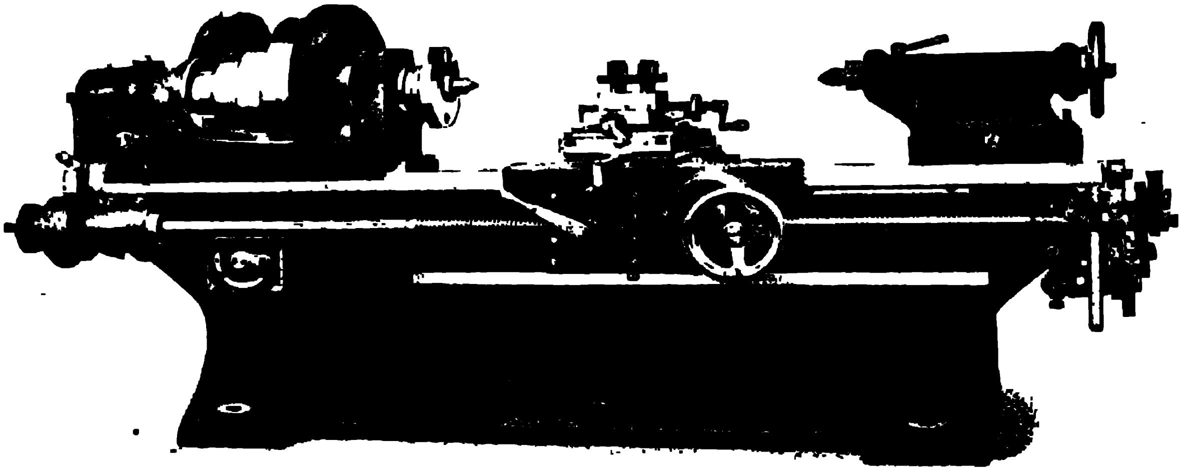
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

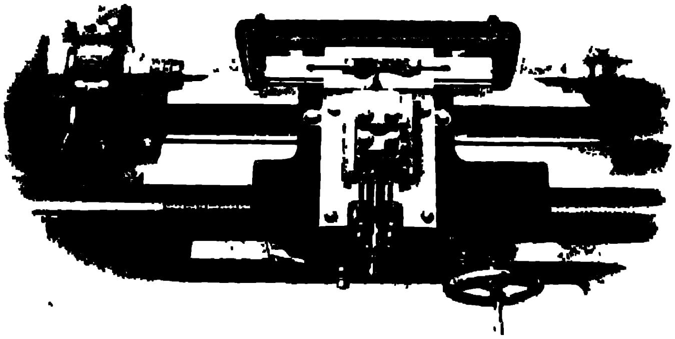
RANGOON, MADRAS.
BOMBAY, LONDON.

9-in. Universal Relieving Lathe.

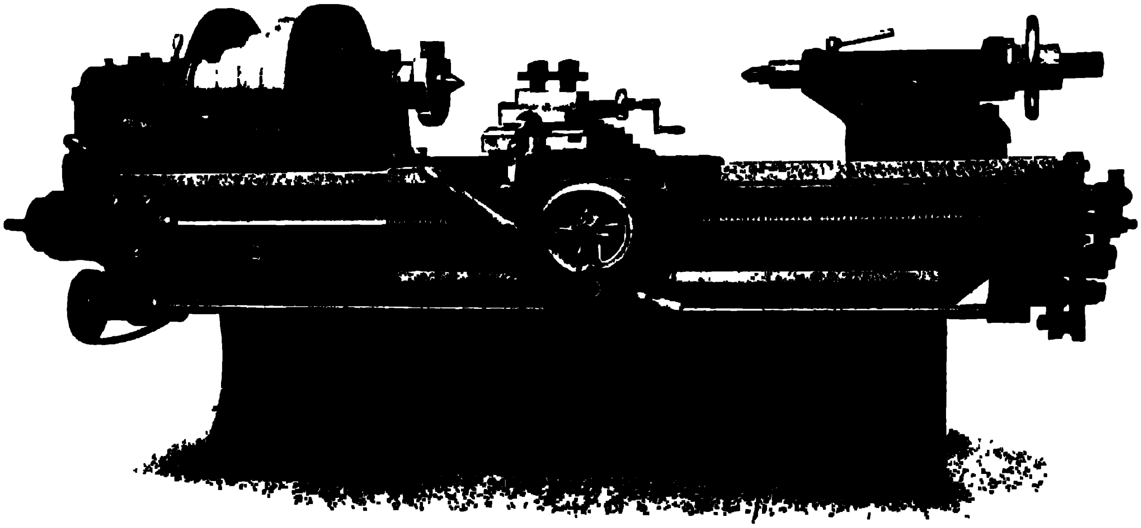
With Narrow Front Guiding Strip and Lower-Tier Bed.



Without Feed Shaft.



Automatic Profiling Slides.



With Feed Shaft.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

9-in. Universal Relieving Lathe.

With Narrow Front Guiding Strip and Lower-Tier Bed.

Advantages of Narrow Front Guiding Strip.

Twisting action of saddle eliminated, by transferring pressure usually taken at the back of the bed to the inner edge of the front raised strip, thereby increasing enormously the relation between length of bearing on bed and distance between guiding surfaces.

Economy in power required to move the saddle along the bed, by elimination of torsion referred to above, added to the fact of the power being applied considerably nearer to the centre of the guiding surfaces than is possible with any saddle mounted in the ordinary manner.

Longer maintenance of true alignment, both as regards sliding and surfacing.

Impossibility of distorting the bed when making the alignment.

Advantages of Lower-Tier Bed.

Perfect support for overhang of saddle exactly where it is most required.

Great effective width, combined with narrow main bed, thereby permitting not only the guiding surface, but the point of application of power to be brought nearer to the centre of lathe and more directly under the average position of the cutting tool than is possible with any wide bed lathe.

Convenient placing of guide screw, as a result of the peculiar form of the bed, easy of access and yet perfectly clear of the operator.

Dimensions.

Height of Centres	9'
Length of Bed	7' 6'
Max. distance between Centres ..	2' 10¼'
Effective width of Bed ..	1' 4½'
Depth of Bed	2' 6½"
Max. diam. to Swing over slide ..	10"
Driving Cone, diam. and width of largest speed	15¼" 3"
Diam. of Spindle Hole	1"
Ratio of Gearing	16 to 1
Morse Taper Centres	No. 4

Spindle Speeds, working	2, 4, 8, 16, 32, 64, 128, 256
return .	5, 10, 20, 40, 80, 160, 320, 640
Countershaft Speed, R P M ..	100 and 250
Max. dist to Swing over Profiling Slides	5¼"
Max. length of work to be Profiled	11"
Floor Space	9' 6" by 3' 6"
Approx nett weight (without Profiling Slides)	47 cwts.
Approx. nett weight of Profiling Slides	2 cwts
Rates of Feed **(for Lathe with Feed Shaft)**	42, 21 and 14

The Accessories comprise:—Reversing Countershaft, 3 Cams, 3, 5 and 7 mm. rise respectively; 3 sets of Change Wheels (for Screw Cutting, for Spiral Gash heads, and for Cutters with Teeth 2 to 40 ins. number); one 8 in. Self-centring Chuck; one Driver Plate; one sample Mandrel, 1¼ in. diam.; one pair of Centres; one 3-Jaw Stand Stay, to admit up to 5¼ in. diam.; necessary Spanners and Handles.

If desired, the lathe can, (at an extra cost) be supplied with an **Independent Feed Shaft** (as per lower illustration on opposite page) for Self-acting Sliding Motion, in order to preserve the lead screw. A Reversing Gear for sliding in either direction is fitted in Saddle Apron.

Profiling Slides for working to formed templates (see illustration) can be supplied at an extra cost.

Detailed Specification and Prices on Application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

10½-in. and 12½-in. Willson Heavy Lathes.

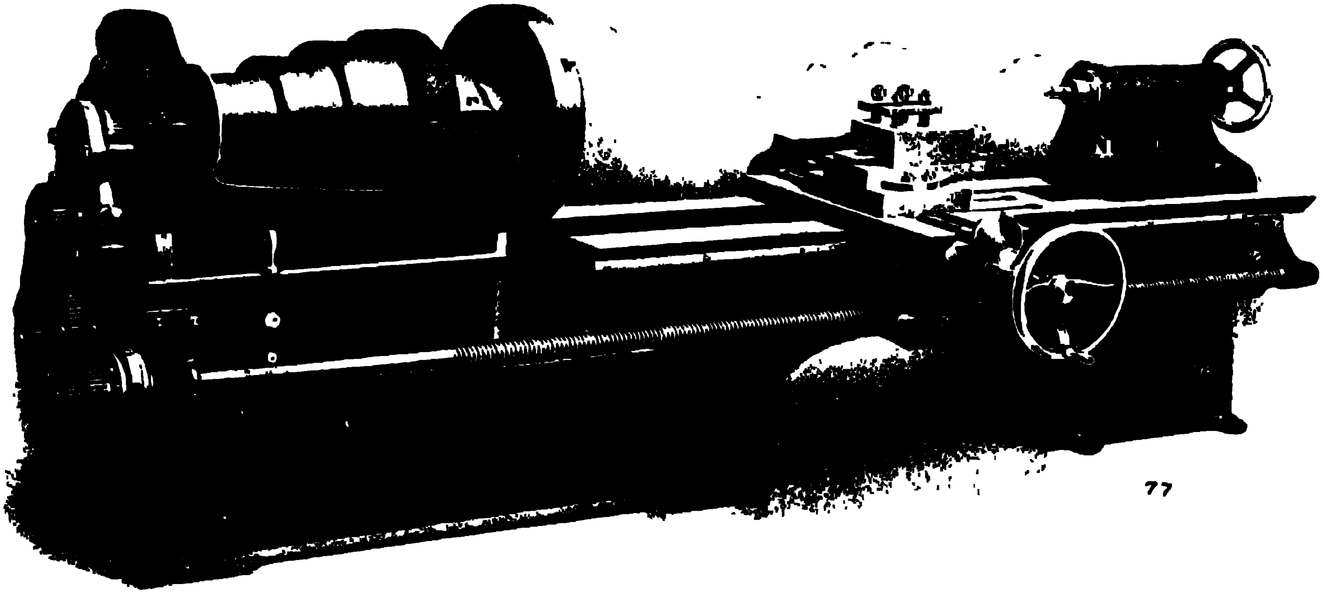


Illustration of 12½" × 12' 0" Lathe.

Bed is of improved design fitted with half gap **Saddle** is fitted with quick hand traverse along bed by steel rack and steel pinion, the pinion being supported directly underneath the rack. **Compound Slide Rest** is accurately indexed in degrees, and is arranged to swivel for Taper Turning. **Leading Screw** is of Steel accurately cut, and is gripped by double clamp nut of width at least double the diameter of Screw. **Fast Headstock** is fitted with **large diameter Spindle,** and the front bearing is fitted with a Ring Oiler. **Reversing Gear** is of improved type, requires no screw key, and is quick and handy to change, and cannot slip out of gear. **Handle Feed Motion** is fitted to backshaft, enabling the operator to change the rate of feed at which Lathe is sliding without moving a gear, by a simple movement of handle in front of the fast Head. **Backshaft** is geared up independent of leading screw, enabling operator to have both screw and backshaft geared up at the same time. **All Gears** are machine-cut from the solid blank, the pinions being of steel. **Sliding and Surfacing Motions to Saddle** are put into gear by Steel Clutches which cannot slip, and are controlled from front of Saddle without the use of screw keys. **Micrometer Adjustment** is fitted to the surface screw. **Loose Head** is arranged to set over for Taper Turning. **Spindle** is ground on dead centres, and is of Siemens-Martin 0.5% Carbon Steel; it is fitted with Patent Ball Thrust Washer.

Accessories supplied with each Lathe: Fixed and Adjustable Travelling Stays, One Face Plate; One Catch Plate; Set of 22 Machine-cut Change Wheels (the small one being of Steel); Overhead Motion and full set of Spanners.

Dimensions.

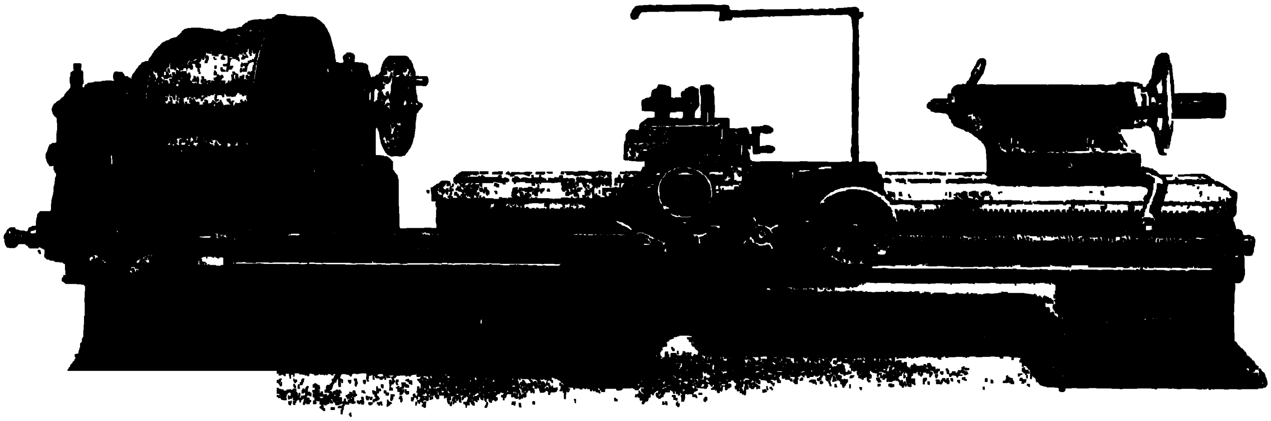
Height of Centres ..	10½"	12½"	Diameter of Lead Screw ..	2¼"	2¼"
Length of Bed ..	12' 0"	12' 0"	" " Backshaft ..	1½"	1½"
Between Centres .	7' 0"	7' 0"	Cone Pulley, large step .	15½"	17"
Swing in Gap ..	3' 5"	4' 0"	" " small " .	9¾"	11"
In front of Face plate	1' 0"	1' 2"	Width of Belt .. .	4"	5½"
Over Saddle ..	1' 4½"	1' 8½"	Approximate Weight .	60 cwts.	75 cwts
Hole through Spindle	2⅛"	3⅛"	H. P. required .. .	4	5
			Price ..	**Rs. 4,100**	**Rs. 4,625**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

New 12-in. Centres Powerful High-Speed Sliding, Surfacing and Screw-Cutting Gap Lathe.



The illustration above shows a 12-in. Lathe, which has been designed to use the latest High-Speed Steels to the best advantage. The Lathe is of very rigid construction, the metal being distributed so as to resist all strains subjected to it when under heavy cuts

Features.

1. The large diameters and widths of driving cones and powerful gearing give ample cutting power under all conditions.
2. Spindle Bearings of ample wearing proportions are fitted with Ring-Oiling Bearings, provided with Sight Feed to Reservoir.
3. Our Patent System of Oiling the Cone Bearings ensures a continual supply of oil when running.
4. Unbreakable Feed Box, all moving parts made from steel stampings; the clutch mechanism is case-hardened.
5. All Saddle Apron Gears run on two bearings, nothing being overhung.
6. All portions of Saddle and Apron oiled from top and properly fitted with oil tubes.
7. Square-Edged Bed with taper gib, all of ample proportions.
8. The Loose Head Spindle has full bearing in all positions, the head is fitted with pawl which engages in rack in centre of bed to take all end thrust.
9. All Gearing is properly guarded.
10. The Lathe is supplied with overhead motion, two face-plates, catch-plate, stationary and travelling stays, 22 change wheels and spanners, also Suds Pump, Piping and Trough.

Dimensions.

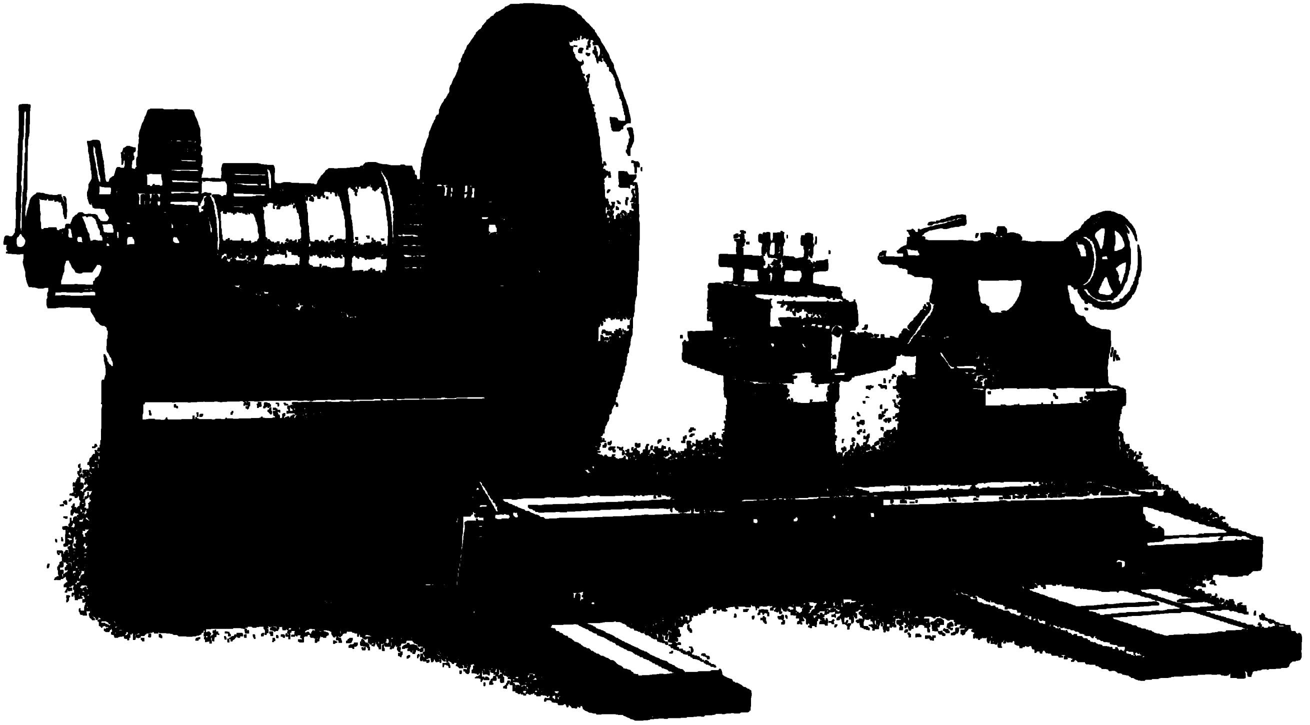
Length of bed	12'	Speed ..	260 and 94 R P.M
Admits between Centres	5' 4"	Spindle Speeds ..	8 to 383 R P.M.
Width of Bed	22" wide by 14" deep	Feeds	8, 16, and 32, or 4, 8, and 16 cuts per inch
Swings in Gap	48" diam. by 12" wide in front of plate.		
Cone	4 speeds, 19" to 28" diam. by 4½" wide.	Leading Screw ..	½" pitch. 2¼" diam.
		Front Spindle Bearing	6" diam. by 8½" long
Gear Ratio	8 to 1	Nett Weight ..	110 cwt.
Diameter of Countershaft Pulleys	24"	Price,	. Rs. 10,500

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Powerful Double or Treble-Geared Surfacing Lathe.



The Lathe illustrated above is constructed to take articles of large diameter and of great weight.

The Treble-Geared Headstock is fitted with a strong forged steel spindle of large dimensions, with parallel or conical bearings, having an eccentric shaft to put the double-gear in or out of motion.

The Treble-Gear Shaft is put into gear by sliding the shaft in or out, and is provided with a positive locking gear in each position

The Face-plate is driven by a pinion on the treble-gear shaft, gearing into an internal wheel on the back of the face-plate.

The Cross Bed which carries the pillar can be put transverse, or longitudinally on the base-plates, suitable slot holes being planed in the base-plates for this purpose.

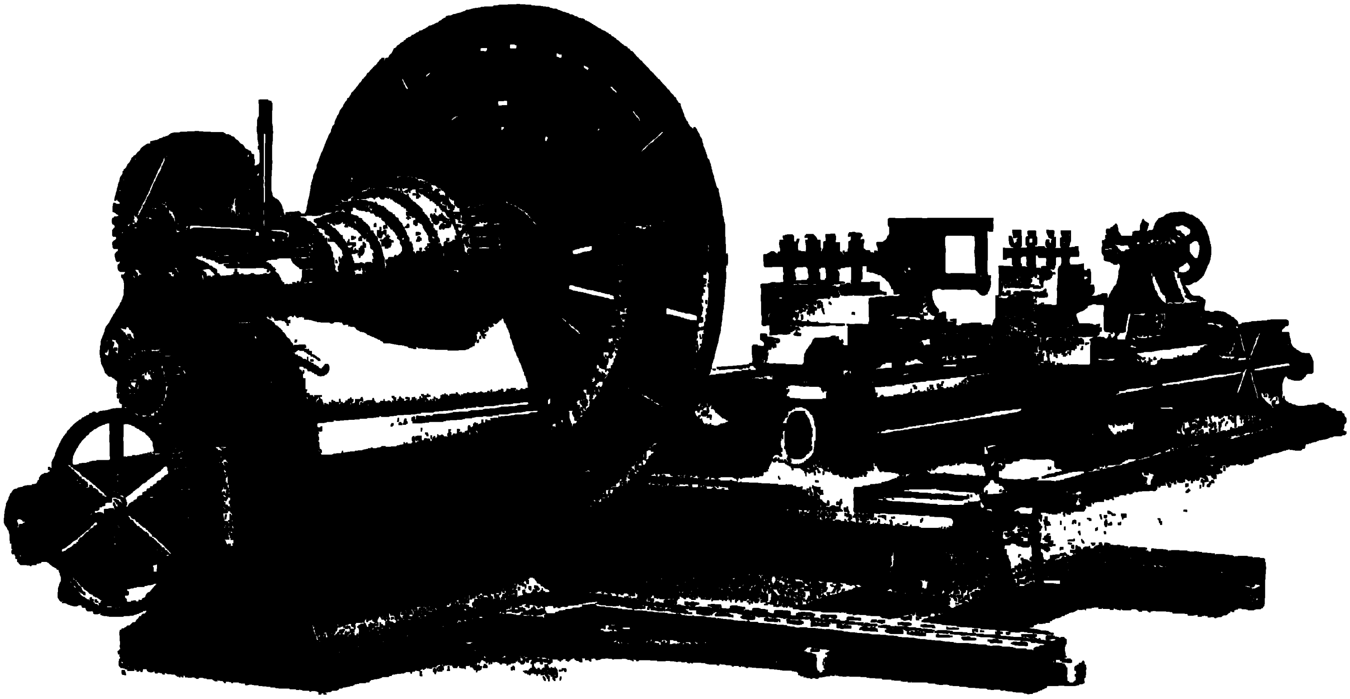
The Self-Acting Feed Motion to tool slide is obtained from an overhead rocking shaft, which is driven by an eccentric on the fast headstock

The Loose Headstock is provided with set-over motion for taper turning, and is moved backwards and forwards by rack and pinion, overhead driving gear, one set of case-hardened forged steel spanners, and pinching bars for moving the cross bed.

Dimensions.

Height of Centres.	Diam of Internal Face plate	Diam will admit over Base plate.	Width will admit in front of Face-plate.	Diam. will admit in Pit.	Width will admit in Pit	No. of Speeds on Cone	Diam. of largest Speed.	Diam. of smallest Speed.	Width of each Speed.	Weight.	Price
ins.	ft.	ft. ins.	ft.	ft.	ft.		ins.	ins.	ins.	Tons.	Rs.
12½	4	6 0	4	8	2	4 or 5	15	6	3½	4	5,90
15	5	6 6	5	10	3	4 or 5	18	8	3¾	5½	7,400
18	6	7 0	6	12	4	4 or 5	22	10	4¼	7	9,87

Self-Acting Treble-Geared Break Lathes.

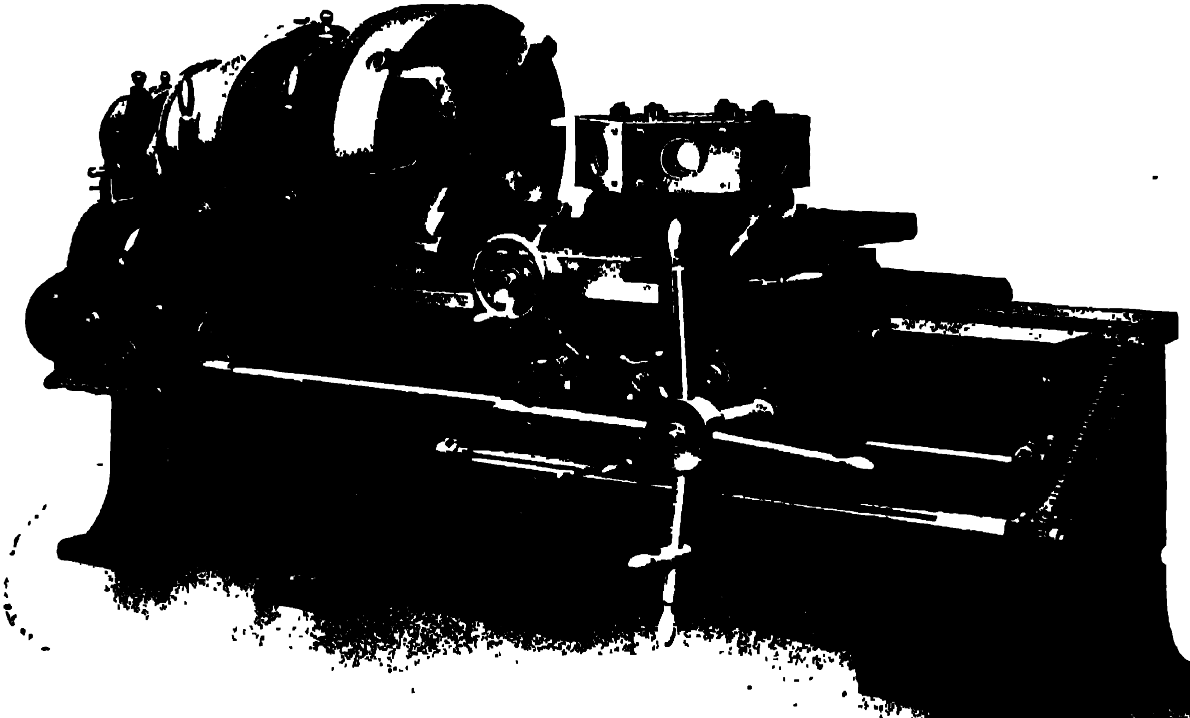


The above illustration shows a treble-geared self-acting sliding, surfacing and screw-cutting Break Lathe. This tool is of massive construction, specially for heavy cutting, and producing quick and accurate work. It can be made, if desired, without the screw-cutting motion, to slide and surface only by backshaft The fast headstock is fitted with forged steel spindle of large dimensions, with parallel necks running in adjustable gun-metal bearings. It can be run single, double or treble-geared as required; the treble-gear shaft is put into gear by sliding the shaft in and out, and is provided with positive locking gear in each position. The face-plate is driven by a pinion on the treble-gear shaft, gearing into the internal wheel on the back of the face-plate. The bed is movable in and out from the face-plate on a planed cast-iron bed by means of a screw, ratchet and lever, thus adjusting the gap to the required width The sliding and surfacing motions are driven from the backshaft, which is sufficiently low across the gap to allow the largest diameter which will run in the gap clearing same. A pit is provided for taking larger diameters than can be turned over the base-plates. A loose cross bed with pillar is supplied for turning large diameters; the pillar is moved along the bed by screw, and has self acting motion from overhead rocking shaft driven by an eccentric at the end of the fast headstock. All gearing throughout the lathe will be machine-cut from the solid Complete with overhead motion, driver and medium face-plate, spanners, handles, etc.

No.	Height of Centres	Movable Bed.		Admits between Centres when Gap is closed.	Diameter will swing over Base-plate.	Width of Gap in front of Face-plate	Diameter of Face-plate	Will swing in Pit.		Approx Weight	Price.
		Length.	Width.					Diam.	Width.		Rs.
1	12 ins.	10 ft. ×	21 ins.	7 ft. 6 ins	6 ft. 0 in.	4 ft.	4 ft.	8 ft. ×	2 ft.	6 tons	8,250
2	15 „	16 „ ×	24 „	13 „ 0 „	6 „ 6 ins.	5 „	5 „	10 „ ×	3 „	10 „	11,250
3	18 „	20 „ ×	26 „	16 „ 6 „	7 „ 0 in.	6 „	6 „	12 „ ×	4 „	15 „	18,750

New 24-in. Swing Powerful High-Speed Surfacing and Boring Lathe.

With Hexagonal Turret and Automatic Stops, and Hollow Spindle with Self-Oiling Bearings.



This Lathe is of entirely new design, and while combining the strength and rigidity necessary for high-speed work, will be found to contain some special features. The saddle carries a large Hexagonal Turret provided with automatic stops, one for each face, these stops being worked from Hexagon bar on front of Lathe, and makes the Lathe of special value for repetition work.

The Headstock is very powerful, the driving is by a three-speed cone of large diameter and width, and is provided with double and treble gear, single and double gear can be changed without stopping the Lathe.

The Lathe is supplied with Overhead Motion, having two sets of Pulleys, and all necessary Spanners, etc.

Dimensions.

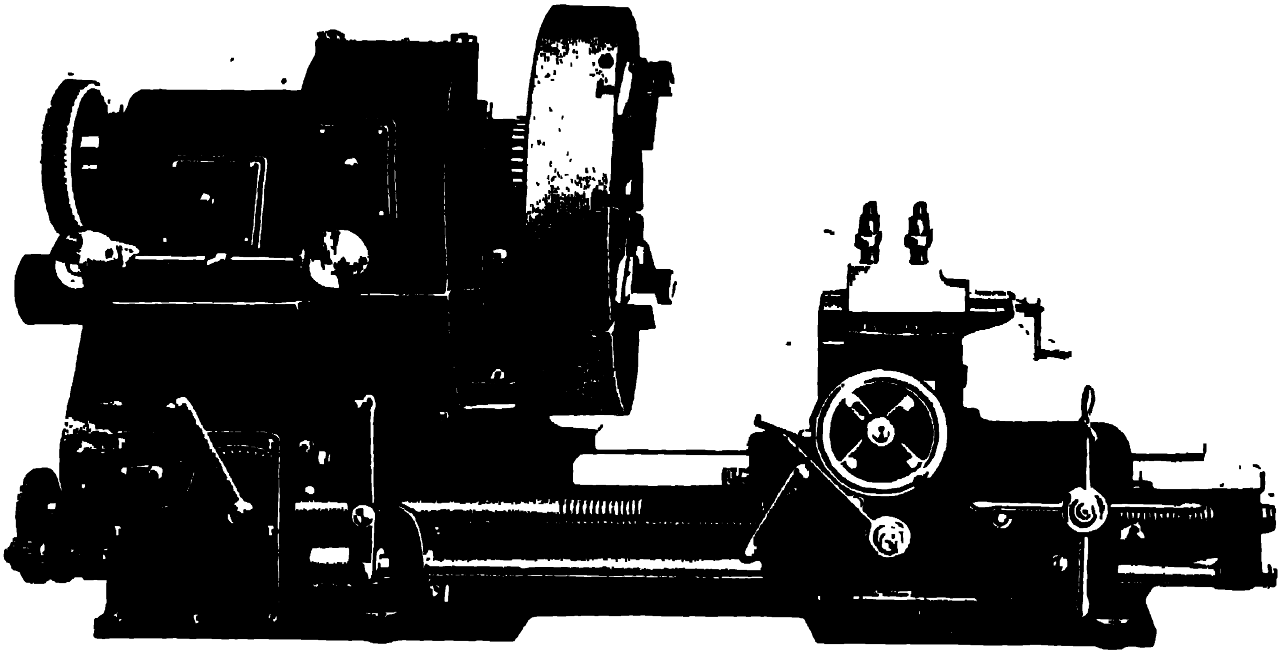
Bed	17¾" width	Feeds ..	16, 32 and 64 cuts per inch
Front Spindle Bearing	5½" diam. by 7½" long	Turret	15" across flats, 8¾" by 5½" face
Hole through Spindle . ..	3⅝"	Holes	3"
Chuck	24" diam.	Will admit from Chuck to Turret Face	18"
Cone, Three Speeds	13½" to 18" diam. by 3½" wide	Overall Dimensions ..	7' 7" by 4' 9"
Spindle Speeds	44 to 432 R.P.M.	Nett Weight	50 cwts
Gear Ratios,	Double Gear, 4.7; Treble Gear, 22.5 to 1	Price, ...	Rs. 7,575
Diameter of Countershaft Pulleys ..	16"		
Speed of Countershaft ..	325 and 135 R.P.M.		

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Double and Treble-Geared Surfacing and Boring Lathes.



The illustration shows a 48-in. Treble Geared Machine with All-Geared Motor Driven Headstock. The 30-in. and 36-in. Lathes are Double Geared and the 42-in. and 48-in. Machines Treble Geared. All sizes can be supplied with Cone Pulley Drive, All Gear Drive by fast and loose pulleys, or All-Gear Drive by Motor.

The Bed is of massive proportions, strong box section, and rests on ground full length.

The Headstock, as stated above, can be arranged for Cone Drive, All-Gear Drive, or Motor Drive. 30-in. and 36-in. Double Geared, and 42-in. and 48-in. Machines Treble Geared.

The Saddle is of very powerful construction and can be fitted with plain compound rest or, at extra cost, Square or Hexagonal Turret.

The Feed Motions are controlled through Gear Box in front of Bed by lever movement, and are hand and automatic in the longitudinal and transverse directions.

Screw-Cutting Motion can, if desired, be supplied at extra cost.

Accessories and Equipment include Countershaft (when supplied with Cone Drive), 4-Jaw Independent Chuck and all necessary Handles and Spanners.

Dimensions.

Will swing in diameter	30″	36″	42″	48″
Diameter of 4-Jaw Chuck	28″	36″	40″	44″
Admits between Chuck Face and Tool Rest	30″	42″	36″	36″
Length of Bed	8′ 8″	10′ 0″	9′ 6″	9′ 6′
Number of Speeds	8	8	16	16
" " Feeds	6	6	4	4
Approx. Nett Weight	68 cwts.	104 cwts.	70 cwts.	98 cwts.

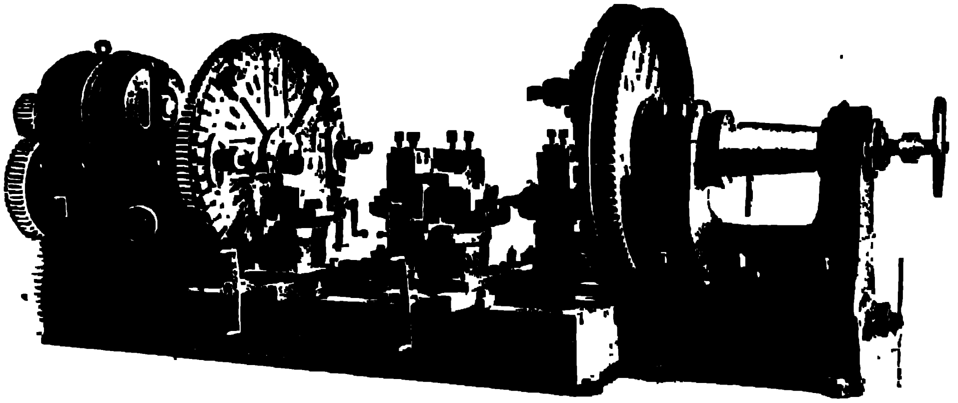
Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

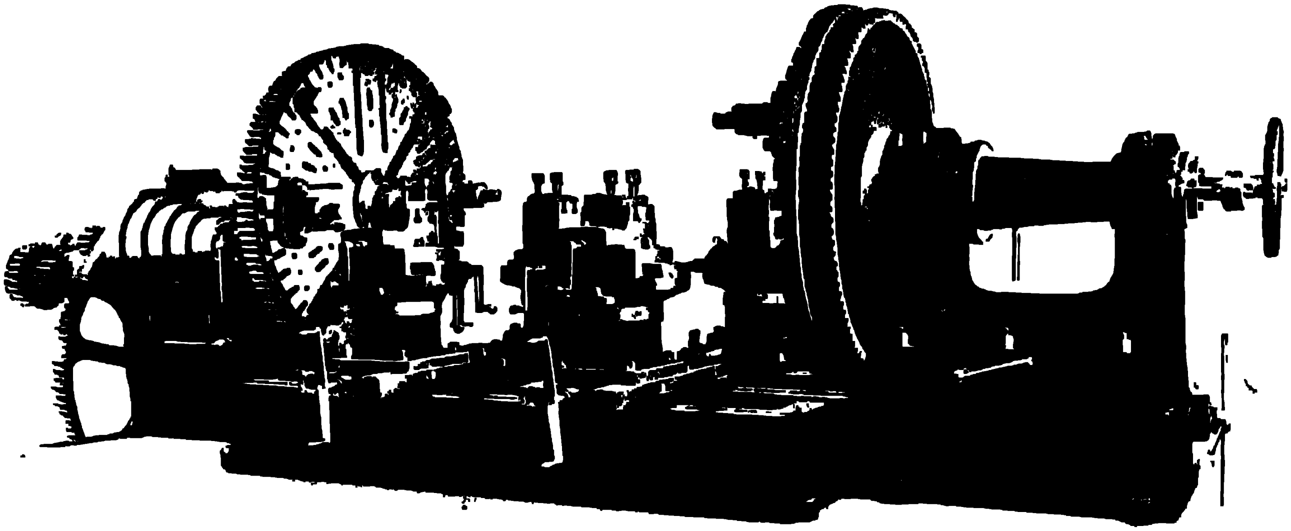
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Double Railway Wheel Lathes.



Direct Electric Drive.



Cone Drive.

Double Railway Wheel Lathes.

The Lathes are of powerful and rigid design, capable of turning a pair of wheels simultaneously on their own axles, or of turning or boring a tyre on one Face-plate whilst boring or bossing a wheel at a quick speed on the other.

The Lathe is supplied with either 2 or 4 compound Self-Acting Slide Rests, mounted on rigid pillars, which in turn are mounted on cross plates on the bed, self-acting motions are obtainable by self-contained rocking shaft chains and rackets.

Each Face plate is fitted with 2 drivers, and one Face-plate has 4 Independent Hardened Steel Jaws.

The Face-plates Spindles are of cast-iron of large proportions revolving in adjustable parallel necks with self-oiling bearings.

The whole machine is well designed for heavy duty and the belt provides ample power for the use of the best high speed steels.

The Headstocks are driven either double or treble gear, all gears throughout the machine are machine cut from the solid, the pinions being of steel where necessary.

The lower illustration represents a Countershaft Cone-driven Machine whilst the upper one shows a Motor driven All Gear Type which is also made in a Single Pulley Belt-driven Machine

Dimensions.

LATHE NUMBER										10
Height of Centres	1' 6"	1 10"	2' 3"	2' 6"	2' 9"	2' 9"	3' 0"	3' 0"	3' 3"	3' 6"
Diam of Wheel on Tread, maximum .	2' 6"	3' 0"	4' 0"	4' 6"	5' 0"	5' 0"	5' 6"	5' 6"	6' 0"	6' 6"
Length between Centres	7' 0"	8' 0"	8' 0"	9' 0"	9' 0"	9' 0"	9' 0"	9' 0"	9' 0"	9' 0"
Diam. of Face-plates..	3' 0"	3' 6"	4' 6"	5' 0"	5' 6"	5' 6"	6' 0"	6' 0"	6' 6"	7' 0"
Front Spindle Neck, Diameter ..	7"	8"	8"	10"	10"	11"		12"	12"	14"
Front Spindle Neck, Length	9"	10"	10"	12½"	12½"		14"		15"	18"
Bottom Shaft, Diam .	3½"			4½"	4½"					6"
Length of Bed	13' 0"	15' 4"	15' 4"	18' 3"	18' 3"	19' 6"	19' 6"	20' 0"	20' 0"	20' 0"
Width of Bed (2 Rests only)	3' 4"	4' 1"	4' 1"	5' 1"	5' 1"	-		5' 9"	5' 9"	5' 9"
Depth of Bed .	10"	12"	12"	12"	12"	16"	16"	18½"	18½"	18½"
Approx. Nett Weight	100 cwts.	140 cwt.	170 cwts.	250 cwts.	260 cwts.	280 cwts.	320 cwts.	420 cwt.	460 cwts.	500 cwts.
Extra Weight for Electric Equipment	1050 lbs.	570 lbs.	1600 lbs	1950 lbs	1950 lbs	1950 lbs.	1950 lbs	2400 lbs	2400 lbs	2600 lbs
Price, Cone driven Machine, 2 rests **Rs**	**7,500**	**9,300**	**10,200**	**13,100**	**14,400**	**15,800**	**16,800**	**71,400**	**23,500**	**25,600**
Price, Motor-driven Machine, 2 rests **Rs.**	**9,700**	**11,800**	**12,800**	**15,800**	**17,000**	**18,800**	**19,800**	**24,800**	**26,900**	**29,200**
Price, Machine arranged for Motor-drive but without Motor, 2 rests **Rs.**	**8,100**	**10,000**	**10,900**	**13,800**	**15,000**	**16,600**	**17,600**	**22,300**	**22,400**	**26,500**
Approx. H.P. required	14	16	18/20	20/22	20/22	21	24	26	26	30

If arranged with 2 Back Rests, each carrying 2 Tools for Turning down the sides of Tyres making a total of 4 Rests in all

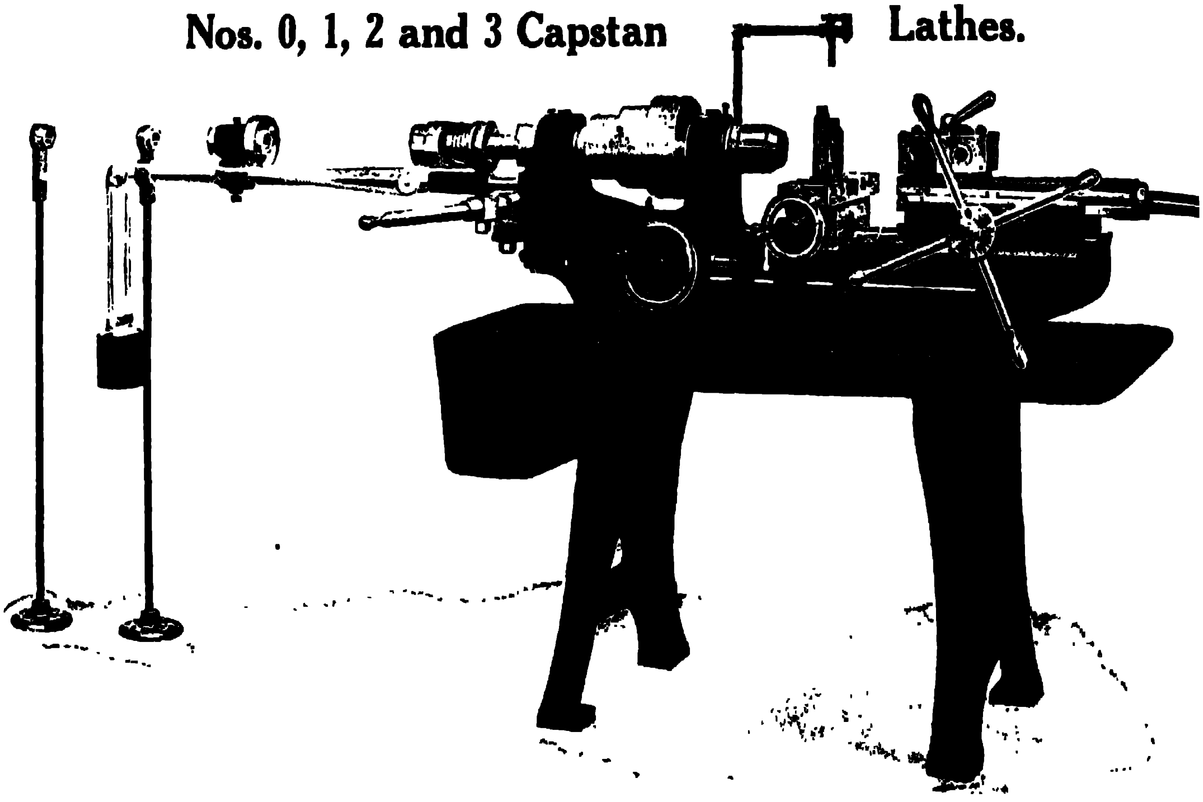
Approx Nett. Weight	140 cwts.	160 cwts.	200 cwts.	230 cwts.	300 cwts.	340 cwts.	400 cwts.	500 cwts.	540 cwts.	580 cwt
Price, Cone driven Machine, 4 rests .. **Rs.**	**9,840**	**11,840**	**12,700**	**16,200**	**17,200**	**19,000**	**20,000**	**24,800**	**27,000**	**29,100**
Price, Motor-driven Machine, 4 rests **Rs.**	**12,040**	**14,340**	**15,300**	**18,900**	**20,100**	**22,000**	**23,000**	**28,200**	**30,400**	**32,700**
Price, Machine arranged for Motor-drive but without Motor, 4 rests **Rs.**	**10,440**	**12,540**	**13,400**	**16,900**	**18,100**	**19,800**	**20,800**	**25,700**	**27,900**	**30,000**
Price, Extra 4 Jaws for 2nd Face-plate **Rs.**	**480**	**500**	**500**	**520**	**520**	**520**	**520**	**560**	**560**	**560**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEE

RANGOON, MADRAS,
BOMBAY, LONDON.

Nos. 0, 1, 2 and 3 Capstan Lathes.



For the high-speed machining of work made from Steel and Brass Bars, Tubes, Castings, Stampings, etc.

Bed is of special Box Section, mounted on Legs, and fitted on Trough for Lubricant.

Headstock on the Nos 2 and 3 machines is cast solid with Bed, affording great rigidity **The Spindle** is of special steel, hardened and ground, and runs in adjustable Phosphor Bronze Bearings. Special Ring-Oiling Lubrication arrangements are provided. End Thrust is taken by Ball Thrust Washers.

Automatic Chuck and Bar Feed Mechanism operated by lever movement, enabling Chuck to be opened or closed without stopping the machine For Machining Castings, etc., Automatic Chuck is removable, thus enabling 3 or 4-jaw Chucks to be fitted. Support Pedestal is supplied for long Bars.

Capstan is dust-proof, indexing mechanism being hardened and ground, and revolves automatically on backward stroke Six Automatic Adjustable Stops, one for each Tool in the Turret, are fitted. Round Turrets are finished with Nos 0 and 1 Machines and Hexagon Turrets on Nos. 2 and 3 Machines

Cut-off Rest is fitted with two Tool Holders, one each back and front. The Nos. 0 and 1 Machines have not the longitudinal traverse motion illustrated except when specially ordered at extra cost This motion is included as standard with Nos. 2 and 3 Machines, and automatic stops are fitted for machining to exact lengths.

Standard Outfit of Tools. Customers' requirements vary greatly, but a representative Equipment would consist of the following, which could be supplied at extra cost:—Three Extra Chuck Collets. 1 Adjustable Stop, 1 Centring and Facing Tool, 1 Drill Chuck, 2 Box Turning Tools, 1 Self-releasing Tap and Die Holder with 1 Tap and Die, 1 Parting-off Tool.

Accessories and Equipment. Included with each Machine are:—Complete Overhead Reversing Countershaft, Bar Support, 1 Collet, Handles and Spanners

		No. 0	No. 1	No. 2	No. 3
Largest bar admitted through automatic chuck ..		¾"	1"	1¼"	1½"
Hole through spindle when automatic chuck removed		1"	1¼"	1⅝"	1⅞"
Height of centres ..		4"	5"	5⅝"	7"
Working stroke of capstan . ..		3⅝"	4"	7"	6"
Diameter and width of largest cone ..		6"×1¾"	7"×2⅛"	8"×2⅝	10"×3¼"
Centre of tool holes to top of capstan slide		1⅝"	1⅝"	1¾"	2⅛"
Diameter of tool holes in capstan ..		¾"	1"	1⅛"	1⅛"
Approximate nett weight	Cwts.	5	7	9	11½
" gross " ..	"	7	9	12	15
Price "	**Rs.**	**2,330**	**2,440**	**2,700**	**4,150**
Extra Oil Pump and Fittings ..		**135**	**145**	**190**	**245**
Extra Standard Outfit of Tools					

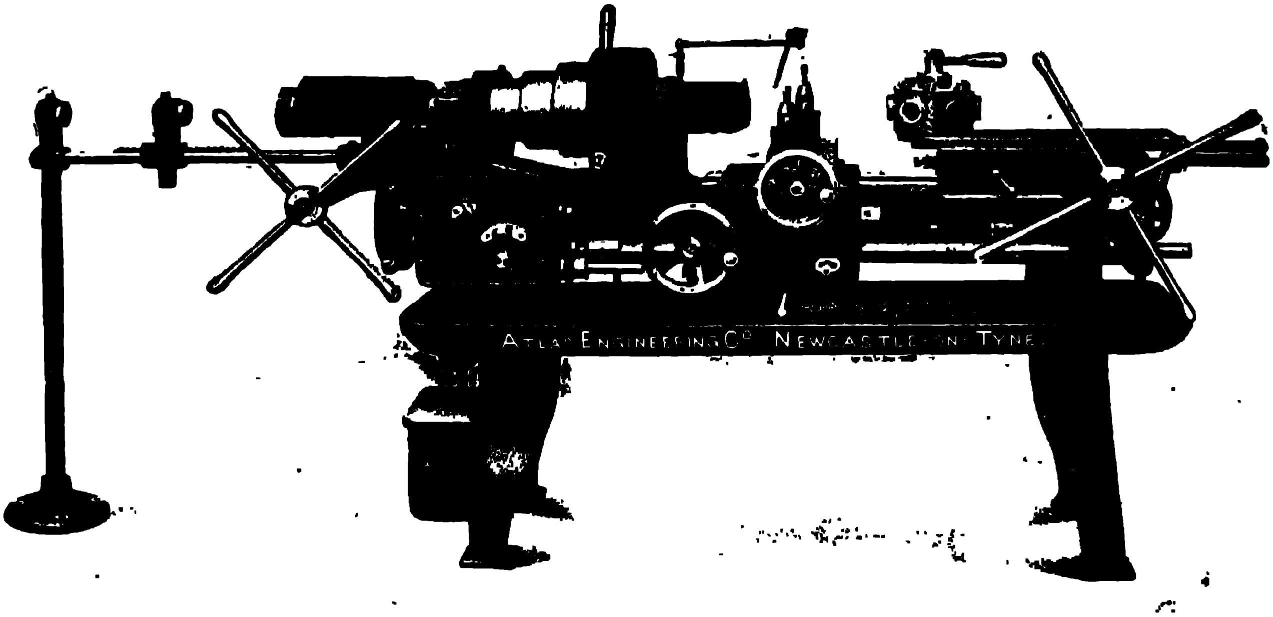
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Nos. 3a, 4, 4a and 5 Capstan Lathes.

For Bar and Chuck Work.



These Machines are supplied with Friction Geared Headstocks. Special Chasing Saddle for screw-cutting can be supplied at extra cost and also Automatic Longitudinal Feeds to the Traversing Saddle and Hexagon Turret Slides.

If desired, the Automatic Chuck and Bar Feed can be eliminated where the machines are intended for Chuck, and 3-Jaw Chuck fitted instead.

Friction Geared Headstock. The Machines have Friction Back-Geared Headstocks operated by Friction Clutch and Lever giving two spindle speeds for each step of the Cone, which, in conjunction with the two-speed Countershaft supplied with the machines, gives 12 spindle speeds.

Chasing Saddle which can be fitted to the Nos. 3a, 4, 4a and 5 Machines, is for screw-cutting. It is incorporated with the Traversing Cut-off Rest and consists of Leader and Nut, which can be changed to suit different pitches of thread. The Leader is driven by gearing from the Lathe Spindle and will cut pitches which are multiples of its own thread in the ratio of 1, 2, 3 and 4. Thus a Leader of 4 threads per inch will cut 4, 8, 12 and 16 threads per inch. Provision is made for cutting of right and left-hand threads.

The Nut is connected with the Tool Slide so that when it is withdrawn from the Leader, the Tool is simultaneously withdrawn from its cut. The additional depth of cut for each successive travel over the work being obtained by the cross-feed screw. If desired, taper turning and chasing attachment for internal or external work, boring, turning and screw-cutting, can be supplied at extra cost.

Particulars and prices on application.

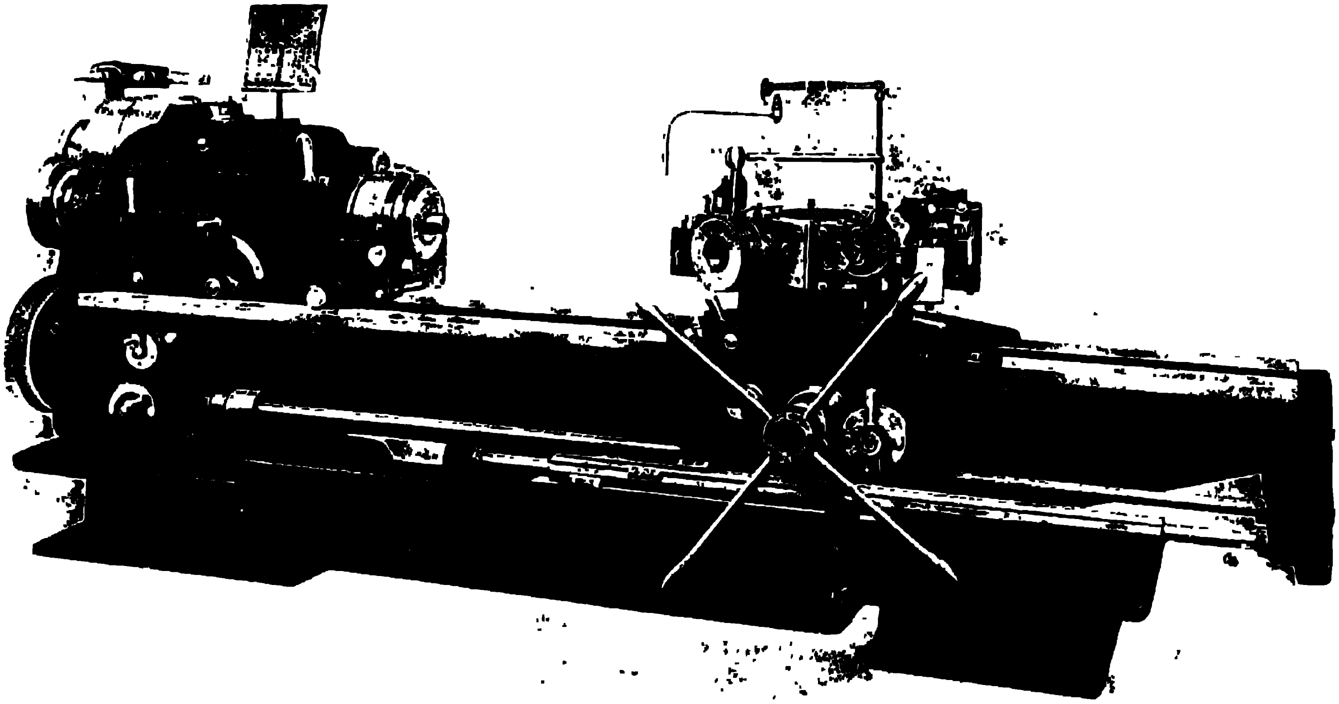
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hexagon Turret Lathes for Bar Work.

Nos. 15 and 16 Combination Turret Lathes with Chasing Saddle.



These machines have been designed for a large variety of bar and chuck work and can be equipped with a standard outfit of tools to cover a large range of work The No. 16 Machine, being considerably larger and more powerful, differs from the illustration

The Drive is by All Geared Headstock by fast and loose pulleys giving 18 changes of spindle speeds in geometric progression, all changes being actuated by lever movement and positive clutch Gears cut from solid steel blanks, and run in oil All bearings and running sleeves bushed with Phosphor Bronze Ring Oiling arrangements to main bearings

The Spindle is of special Crucible Steel and has hole right through Runs in parallel Phosphor Bronze bearings, and has ball thrust washer for end thrust Rear spindle fitted with Bell Chuck for supporting long bars

The Hexagon turret has large faces for heavy box tools, etc, and holes with clamping pads for boring bars, etc. Twelve changes of feed are provided and automatic self-selecting stops for each face of the Turret Indicator is fitted for accurately machining to dead lengths. Turret indexing mechanism consisting of locating plunger and bushes of tool steel, hardened and ground. Lever rigidly clamps Turret Slide to bed. Rapid power motions are obtainable in both directions.

Chasing Saddle has automatic longitudinal and cross feeds, with six changes in both directions, controlled by 4 automatic stops for the longitudinal and transverse feeds The chasing mechanism enables internal and external threads to be rapidly produced

Chasing is performed by leader or short guide screw engaging into Phosphor Bronze nut in the apron Each leader will cut pitches without the use of loose gears, for example, a leader and nut cut four threads per inch, will cut screws 4, 8 and 16 threads per inch. The Chasing saddle can be made for Taper turning, boring and threading at extra cost

Square Turret is mounted on compound slide and arranged to carry four tools It is of steel and provided with case-hardened set screws

Accessories and Equipment. Included with the standard machine is oil pump and fittings, one leader and nut of any desired pitch, and necessary handles and spanners

	No. 15	No 16.
Height of Centres .	9"	11"
Swings over Bed . .	18"	23"
Diameter of Hole through Spindle . .	2 5/16"	4⅛"
Swings over Saddle	12¾"	4¾"
Capacity for finished Bar Work	2½"×30" long	4"×40"
Travel of Saddle carrying square Turret	36"	37"

	No. 15.	No. 16.
Travel of Hexagon Turret ..	36"	40"
Length which can be chased ..	12"	15"
Diameter and Width of Driving Pulley	14"×4½"	14"×5"
Approximate Nett Weight ..	54 cwt.	80 cwt
„ Gross „ ..	60 „	97 „

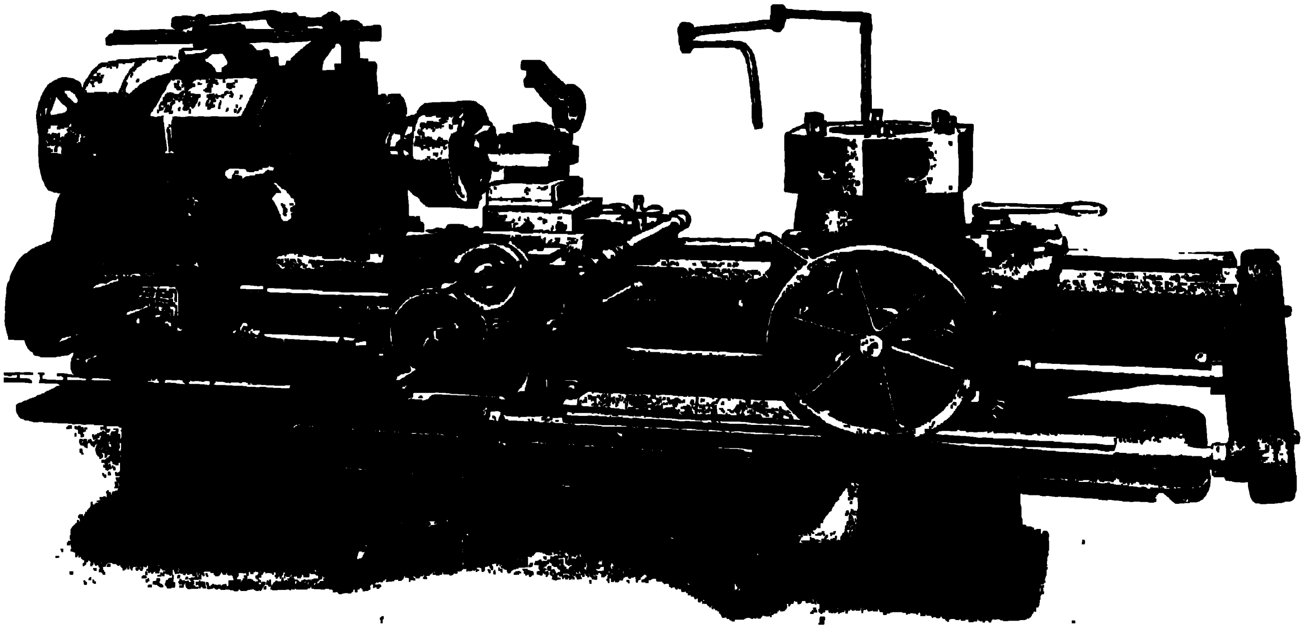
Full particulars and prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Combination Turret Lathe with All-Gear Drive.



Hexagon Turret Lathes.

For work up to —No 1 1⅝"×21"; No. 2 2½"×30"; No. 3 3½"×42"

These Machines are for the rapid production of work made from Round, Square, or Hexagonal Bars. They are supplied with a complete outfit of standard tools for handling a wide range of work

The Headstock is of the all-geared type, requiring no countershaft The Casing forms an oil bath for the Gears, which are of special steel The Spindle is of five Carbon steel, accurately ground, and has ring lubrication Ball Thrust Washer is fitted for end thrust Three-jaw Chuck, fitted to Rear of Spindle for steadying long Bars The Automatic Double-Toggle Chuck can be opened and closed while machine is running It is furnished complete with full set of Collets and spacing piece for Round, Square and Hexagonal Bars.

The Hexagonal Turret and slide permits long bars to pass right through The Indexing Mechanism is of Tool Steel, Hardened and Ground Automatic Trip Stops are mounted in Hexagonal Stop Bar geared with the Turret and rotating with same thus ensuring correct stop for each Turret Face. Twelve stops are provided, two for each Turret Face The Apron affords double support for all shafts and gears All gears are of steel The Automatic Feed is operated by falling Worm Box, and is positive and instantaneous.

The Feed Box gives eight rates for feed to Turret slide, together with Reverse all of which are effected by Lever movement, operated without stopping the machine A safety slipping Clutch prevents damage should the capacity of the machine be exceeded.

Tool Equipment for Locomotive Stay Bolts These machines can be specially equipped with Tools for making stay bolts, made from bars or forgings, enabling both ends of the stays to be machined at one setting, and ensuring accuracy and continuity of pitch This equipment is quoted as an extra.

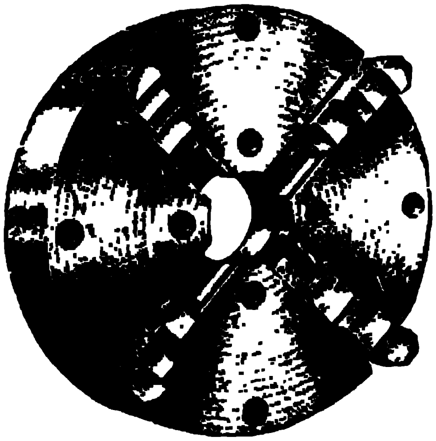
Accessories and Equipment. Each Machine is furnished complete with full set of Conical holders for Round, Square and Hexagonal Bars; three-jaw Chuck for Rear end of Spindle; Pump; Splash Guards and all fittings, Patent Self-Opening Diehead for Screwing, centring and rounding tool holders and tools; with flat steadies; two turning tool holders with roller complete with Dies; one turning tool holder Slide; one Triple Tool Holder with Adjustable Stop; steadies; one cutting-off and forming Tool graduated Scale Pointer; Speed Chart; Tray for Collets; Bar support pedestal, Tool Cupboard; necessary Spanners.

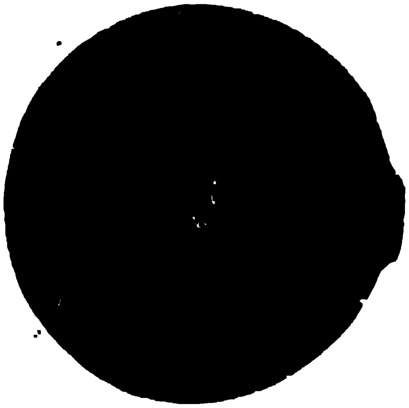
	No. 1.	No. 2	No. 3.
Largest Bar admitted through Automatic Chuck	1⅝"	2½"	3½"
Maximum Length Turned . ..	21"	30"	42"
Largest Bar admitted through Turning Tool	1⅝"	2½"	3¼"
Height of Centres	7"	9"	10"
Length of Bed	6' 6"	7' 9"	9' 9"
Diameter of Hole through Spindle ..	1 11/16"	2⅝"	3¾"
Size of Turrets across Flats	12"	14"	17⅜"
Turret Holes bored	2⅛"	2½"	3¼"
Number of Feeds to Turret	8	8	8
„ Spindle Speeds	16	16	16

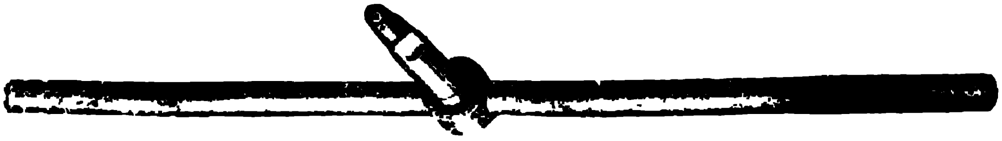
Full particulars and prices on application

Lathe Chucks.

Taylor's Self-Centring and Independent Chucks.







These Chucks are universally recognised as being of the best makes and are British made throughout of the best materials obtainable, on the most modern and up-to-date machinery. The Chucks are absolutely accurate, powerful, yet easy to operate and adjust, and are adaptable for many classes of work, and if properly cared for, will give years of good service. Special attention has been given to the sliding ways for the jaws which have been made of ample proportion to withstand the heaviest strains that may be applied. All screws for the adjustment of jaws in both types of chuck are of oversize design, to prevent any undue wear due to the continuous locking and unlocking of the chuck jaws and these permit extra pressure being applied to the jaws without fear of stripping or breaking either the screw or jaw threads.

Both types of chuck are complete with back plate: the universal with a plain plate and the spiral with a plate designed to enable the chuck to be moved from the lathe spindle without applying any force to the chuck itself which would tend to damage and affect its accurate centring.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Patent Spiral Self-Centring Chucks.

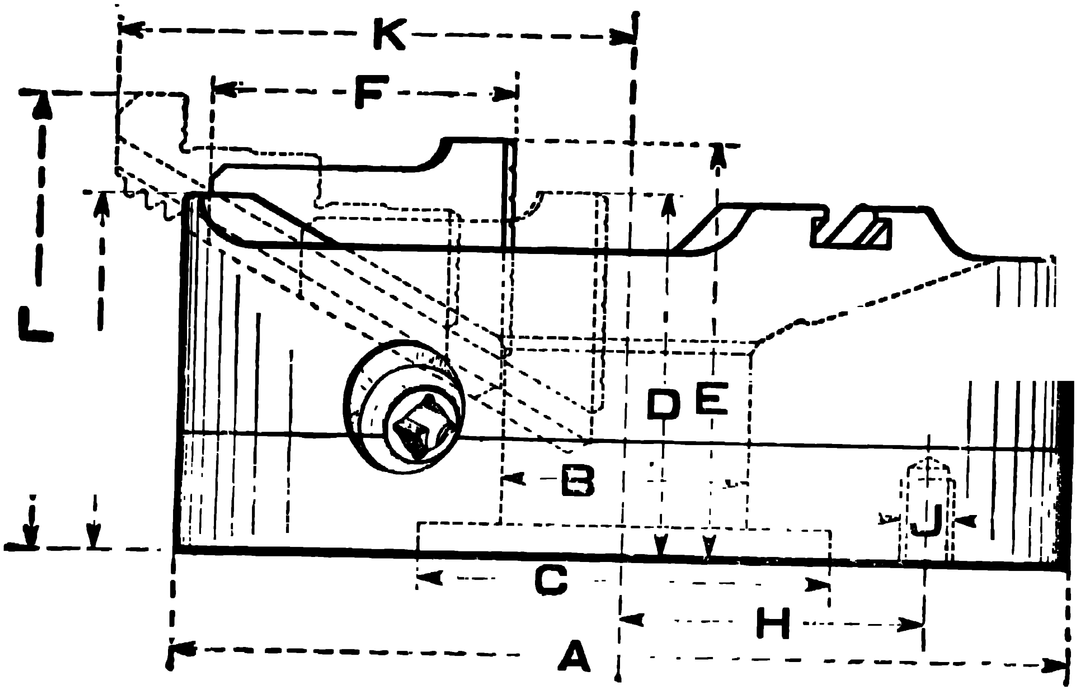


Fig. 3

Outline of Chucks Showing Jaws in Extreme Positions.

A—Actual diameter of Chuck body.
B—Diameter of Hole through centre of Chuck.
C—Diameter of recess in back of Chuck in which adapter is to be fitted
D—Distance from back of Chuck to face of Jaws, when holding bars of minimum diameter.
E—Distance from back of Chuck to face of Jaws, when holding bars same size as standard bore of Chuck.
F—Length of Jaws.
G—Depth of Chuck body.
H—Radius of the 6 Tapped Holes for fixing Chuck to adapter; (in smallest size, *viz*, 4-in., there are 4 only).
J—Size of Whitworth thread of 6 Tapped Holes for fixing Chuck to adapter (see H).
K—Overall radius of Jaws when holding **maximum allowable diameter of work, which equals diameter of body of Chuck.**
L—Maximum overall depth of Chuck with Jaws in extreme position.

Approximate Dimensions of 3 & 4-Jaw Spiral Chucks.

Size	Will hold bars from	to	A †	B Standard	B Max.	† C	D	E	F	G	H	J	K	L	Size
4½ in.	9/32	¾	4½	13/16	15/16	3 1/16	3	3¼	1 9/16	2¾	1⅞	⅜	2 13/16	3 5/16	4½ in.
5½ in.	5/16	1	5½	1 1/16	1¼	3⅞	3 1/16	3½	2 3/16	3 5/16	2⅜	⅜	3¼	4¼	5½ in.
6½ in.	⅜	1¼	6½	1 5/16	1⅝	4 [illegible]	3 13/16	4 1/16	2 [illegible]	3 [illegible]	2 [illegible]	⅜	3 13/16	5	6½ in.
8½ in.	9/16	2⅜	8½	2½	2⅞	6½	4¼	4⅞	3 3/16	3 [illegible]	3 13/16	5/16	4 13/16	5½	8½ in.
10¼ in.	11/16	2 11/16	10¼	2 13/16	3⅜	4⅝	4 13/16	5¼	3⅜	4 5/16	3 1/16	⅜	5⅝	5 9/16	10¼ in.
12¼ in.	13/16	3½	12¼	3⅜	5⅛	6⅛	4⅜	5 1/16	4¼	4 [illegible]	4⅜	⅝	7	6 1/16	12¼ in.
16¼ in.	⅞	5	16¼	5⅛	6¾	9⅜	4 13/16	6⅛	5½	5 3/32	6⅛	¾	9¼	7	16¼ in.
20 in.	1	6½	20	6 9/16	8½	11	5	6 13/16	7 9/16	5 11/16	4 13/16*	⅞	11⅛	7¼	20 in.

*This dimension may be varied, up to a maximum of 9-in., to suit requirements.

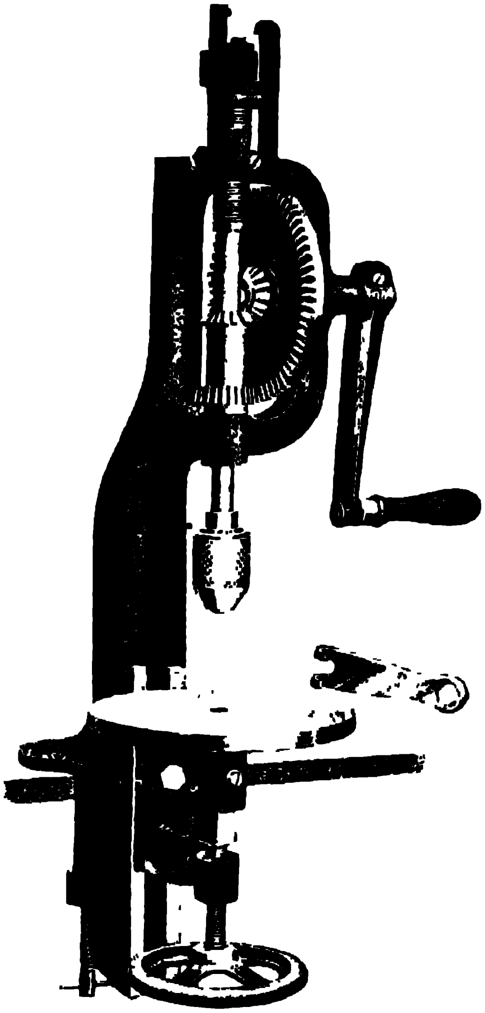
† In the above table of dimensions the sizes given as the Standard bores are the ones to which the Chucks are made and stocked, but for special purposes requiring larger work to pass into or through the bore of the Chuck, it can, at an extra charge, be bored to the maximum sizes given. We recommend that the bore of the Chuck should not be increased more than absolutely necessary, as it reduces the bearing and support of the jaws when holding small work.

Jaws will hold any diameter, from the smallest size of bar given above, up to the diameter of the Chuck body.

Patent Spiral Self-Centring Chuck Adapters.

Users as a rule are not particular enough about the mounting of this type of Chuck, either as regards the fit on the spindle nose or the design and strength of the adapter, although it is impossible to expect the Chuck to run true unless great care is taken in regard to these points.

"Yankee" Bench Drill. No. 1005.



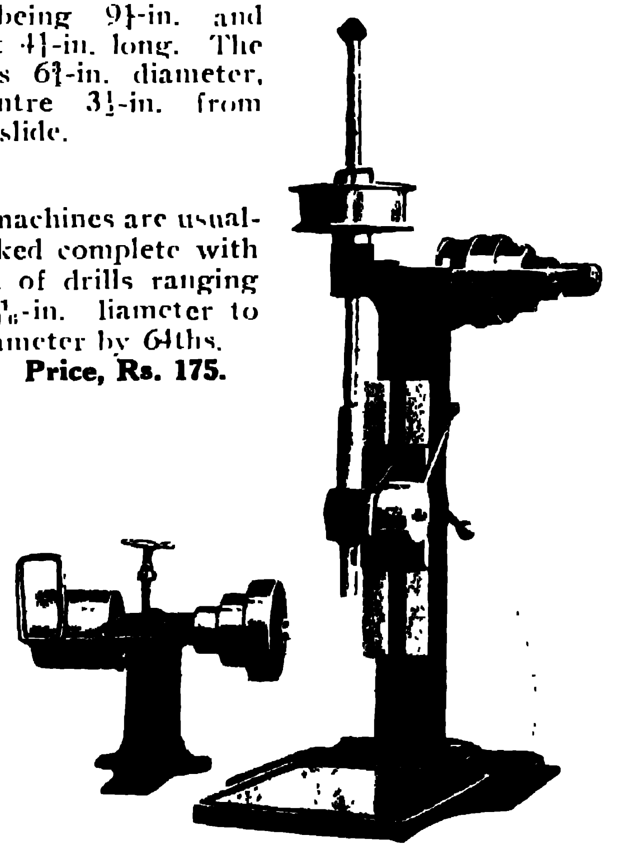
For Drills up to $\frac{1}{2}$-in. Inclusive.

This is made with two speeds and quickly changed from one to the other by simply moving the shifter on spindle to top notch **(S)** for slow, or bottom notch **(F)** for fast speed. When the shifter is placed in centre notch the spindle is locked fast to open or close chuck. The spindle is $\frac{9}{16}$-in. diameter and is of steel; all gears have teeth of extra strength and are cut from solid to run smoothly and accurately, the pinion of slow speed being of steel. The chuck is of steel, $2\frac{3}{4}$ in. long, $1\frac{9}{16}$ in diameter polished and nickel-plated, has three jaws of tool steel hardened, and holds round shank drills up to $\frac{1}{2}$-in. diameter inclusive. The traverse of spindle (automatic feed) is 2-in. Provision is made by bracket with arms to throw off ratchet feed at extreme up or down movement, to prevent parts being jammed.

The bracket at base of column has a vertical adjustment of 5-in., the slide being $9\frac{1}{4}$-in. and bracket $4\frac{1}{4}$-in. long. The table is $6\frac{3}{4}$-in. diameter, its centre $3\frac{1}{2}$-in. from fall of slide.

The machines are usually stocked complete with full set of drills ranging from $\frac{1}{16}$-in. diameter to $\frac{1}{2}$-in. diameter by 64ths.

Price, Rs. 175.



"Denbigh" 13-in. High-Speed Sensitive Bench Drilling Machine.

This machine has been designed to meet the needs of small workshops handling, small but accurate drilling and will drill holes up to $\frac{9}{16}$-in. diameter. The sliding head has a movement of 14-in and can be instantly locked at any point. The Table which forms the base is surrounded by an oil channel and the machine is complete with the overhead countershaft as illustrated.

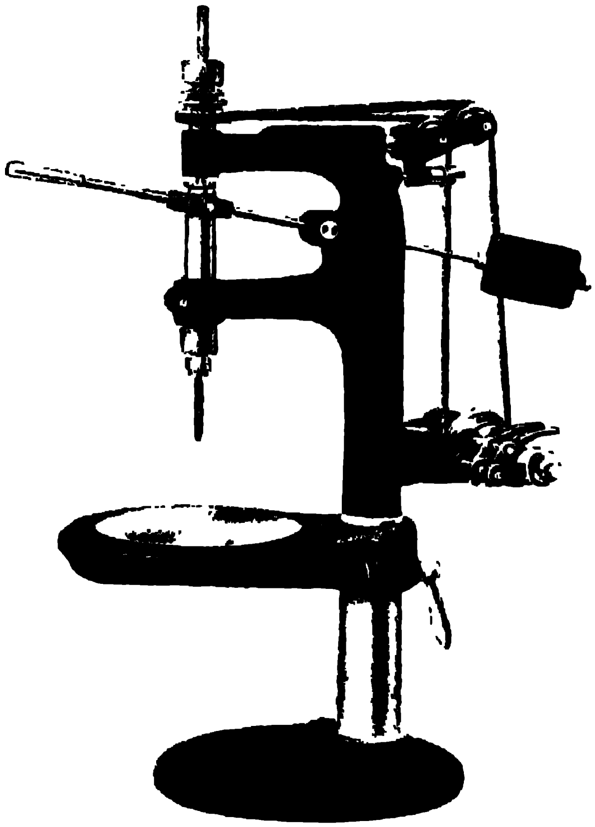
Specifications.

Drills to centre of	13 ins.	Fast and Loose Pulleys	$4\frac{1}{4}\times2$ ins.
Diameter of Spindle	$\frac{13}{16}$ "	Three-Speed Cone	6, 4, $3\times1\frac{1}{2}$ "
Hole in Spindle	Morse Taper No. 1.	Speed	300—350 R.P.M.
Working Surface of Table	10×12 ins.	Floor Space (size of base)	24×16 ins
Distance from Spindle to Table	14 "	Approximate Weight	200 lbs.
Vertical Movement of Sliding Head	14 "		

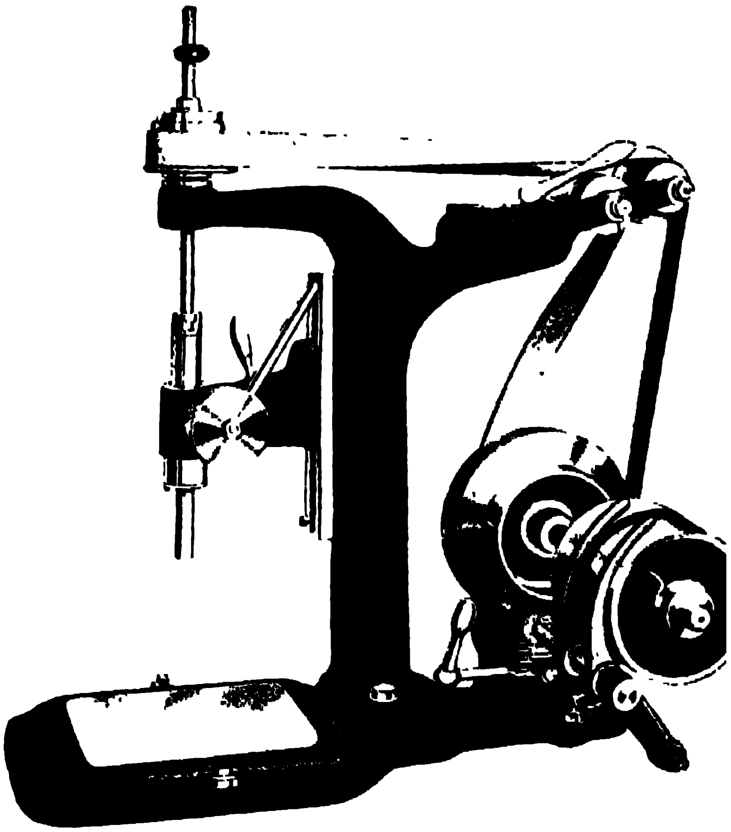
Price, Rs. 270.

Precision Ball Bearing Sensitive Bench Drills.

Made by Messrs. Jones and Shipman, Limited.



12-inch Model 226
10 „ „ 224



10-inch Model 227.

These machines are specially designed for high-class work where very small drills are used necessitating the highest speeds to obtain the best results.

The feed is extremely sensitive, the feed lever being fitted with an adjustable counterweight giving a very delicate balance, and on Model 227 is counterbalanced by means of a coil spring.

The 12 ins. machine Model 226 is driven by a ¼-in. diameter endless belt, and 14 changes of speed are obtainable.

The 10 ins Drill Model 224 is driven by a ¾-in wide endless belt, arranged for single spindle speed only.

The table is adjustable and the column accurately ground.

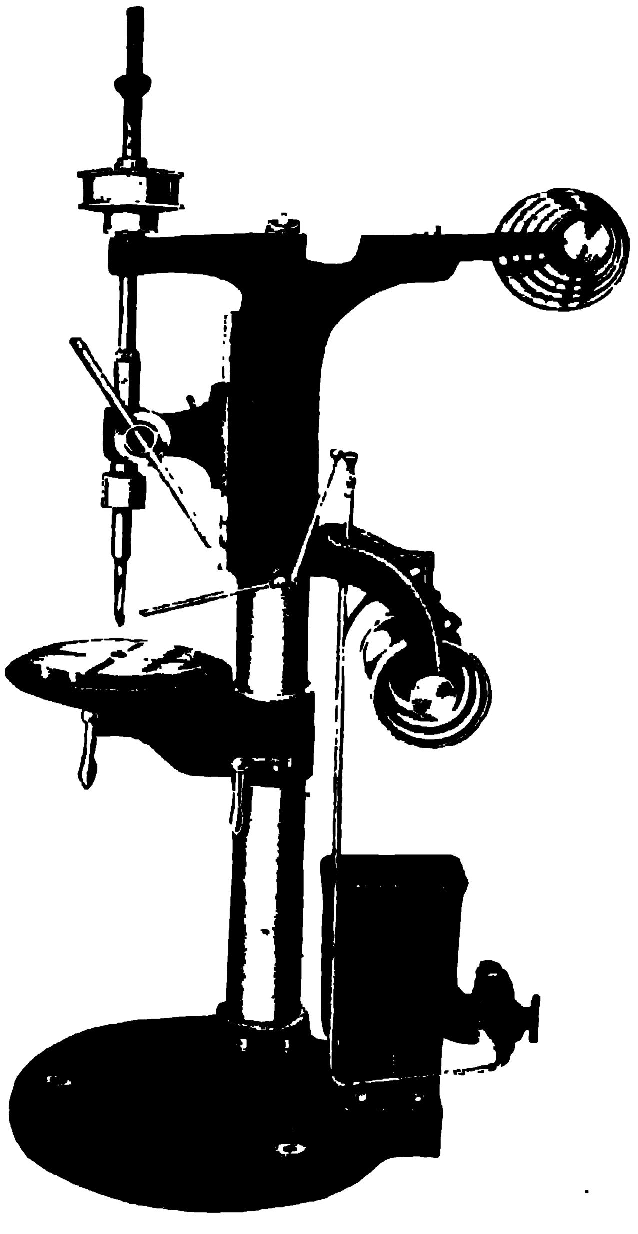
Dimensions.

Model· Nos	224	226	227
Spindle diameter ..	½"	½"	9/16"
„ chuck capacity ..	¼"	¼"	..
„ feed	2"	2"	3"
„ nose to table max.	6"	12¼"	9"
„ centre to column	5 1/16"	6⅛"	5⅛"
„ speed, R. P. M. ..	(1) 5000	(14) 1500 – 4500	2000 & 3000
Table working surface ..	6" diam.	8" diam.	9"×8"
„ overall	8⅛"	10½"	..
„ vertical adjustment	4½"	6⅜"	..
Sliding head, vertical adjustment	..	..	6½"

Model· Nos	224	226	227
Size of Base .. .	10½" diam.	12" diam.	24¼"×13"
Height from Base to top of Spindle Pulley ..	22¼"	29"	24½"
Diameter of Driving Pulley	1¾"	1⅜"	4"
Driving Pulley, width ..	⅞"	⅞"	1½"
„ „ speed R. P. M.	1,750	1,500	1,100
Approximate nett weight	66 lbs.	70 lbs.	160 lbs.
Price .. Rs.	**550**	**600**	**500**

New Century 14-in. High-Speed Sensitive Drilling Machine.

Made by Messrs. Jones and Shipman, Limited.



These Machines are built throughout on Ball Bearings for drilling up to $\frac{15}{16}$ holes. **Eight Ball Bearing** journals and Thrust of the highest grade are fitted and filled with grease sufficient to run without further attention for at least 12 months. **The Column and Head** are cast in one piece ensuring rigidity and accuracy. The **Lower Portion of the Column is Ground** so that the sliding movement of the table is readily adjustable to the exact position. The spindles are operated through rack and pinion by feed lever adjustable for length. **The Feed** is extremely sensitive being counterbalanced by means of a coil spring. The **Sliding Head** is fitted with a new angular locking device which securely holds the head against the heaviest load and in perfect alignment. The **Spindles, Cross Axles, Quills, etc.,** are ground to absolute accuracy, the **Quills** being graduated in fractions of an inch. Belt shifting forks are operated through quadrant and steel rack, the handle being conveniently placed for the operator.

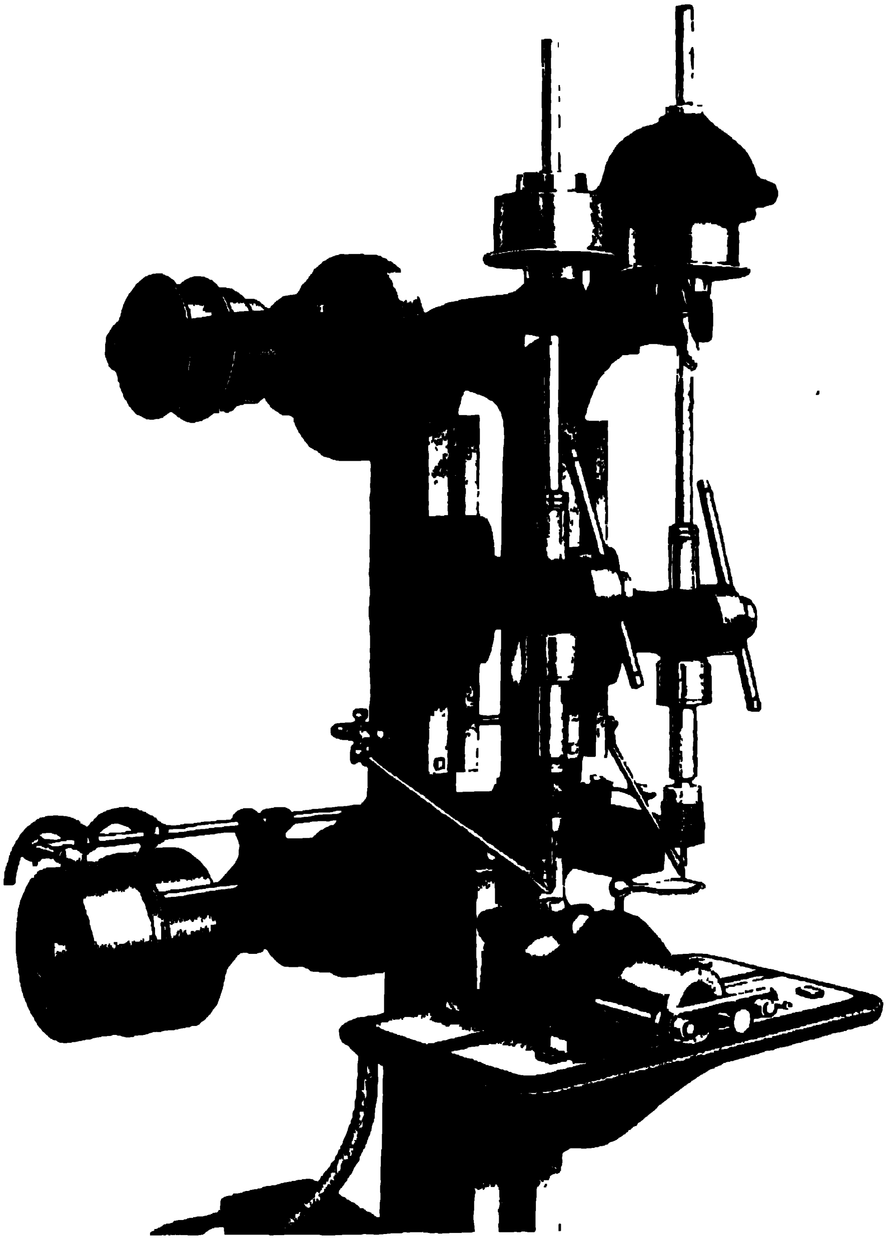
Vertical movement of spindle ...	
Diameter of spindle in quill	
Bore of spindle ...	Morse N
Spindle speeds	510, 742, 1,070, 1
Vertical movement of head ...	
„ adjustment of table ..	
Maximum distance from spindle to table	31"
Working surface of table diameter	11"
Distance from centre of spindle to column ...	
Cone pulley ...	7", 6", 5", 4×1
Fast „	7"×
R. P. M of fast pulley	700
Weight, lbs.	410
Price	**Rs. 725**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON.

"New Century" 14-in. Sensitive Multiple Spindle Drilling Machine.



Made by
Messrs. Jones and Shipman, Limited, Leicester.

These machines embody many important improvements, and they can be supplied with automatic feed and with tapping arrangement to any spindle as desired. The Auto-feed, which has the hand lever feed as well, can be instantly engaged and released and a Quick Return is obtained which is operated by the coil spring returning the drill spindle to the top of its stroke. The tapping arrangement is as shown and is designed for very high output. The heads fitted with tapping reverse mechanism can be fitted with alternate drivers to give a slower speed to the tap as (A) single speed 1 3 reduction pulley, (B) all gear drive giving 4—1 reduction gear ratio.

Specifications.

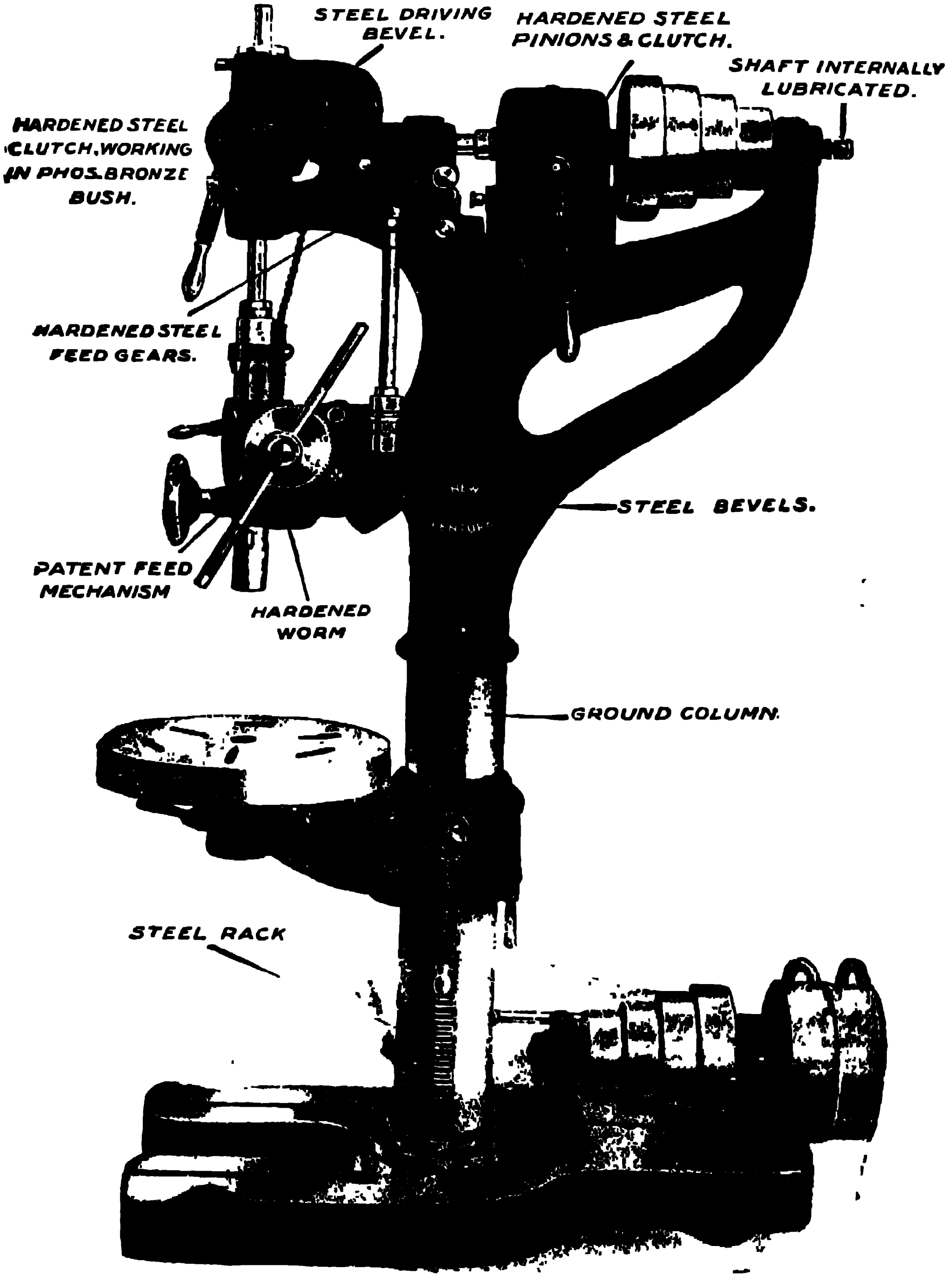
Diameter of Spindle	$\frac{15}{16}$ ins.	Vertical Adjustment of Table ..	21 ins.
Bore of Spindle, Morse Taper ..	No. 2	Maximum distance, Spindle to Table	31½ "
Spindle Speeds	745, 532, 380	Distance from centre of Spindle to column ..	
Feed of Spindle, Ball bearings ..	5 ins.	Distance between Spindles	
" " Plain	5 "	Cone Pulleys, three speeds ..	7, 6, 5 [illegible] ins.
Vertical movement of Sliding Head	10 "		

	2-Spindle.	3-Spindle.	4-Spindle.	6-Spindle.
Dimensions of fast and loose pulleys	9×3 ins.	9×3 ins.	9×3 ins.	12×3 ins.
Speed of fast and loose pulleys ..	380	380	380	380
Working surface of table ..	20×10½ ins.	28×10½ ins	36×10½ ins.	52×10½ ins.
Approximate nett weight lbs. ..	1140	1460	1780	2400
Price	Rs. 1,520	Rs. 2,100	Rs. 2,700	Rs. 4,010

Auto-Feed Tapping Reverse and Gear reductions to any spindle extra as required.

20-in. "New Century" Drill.

Made by Messrs. Jones and Shipman, Limited.


STEEL DRIVING BEVEL.
HARDENED STEEL PINIONS & CLUTCH.
SHAFT INTERNALLY LUBRICATED.
HARDENED STEEL CLUTCH, WORKING IN PHOS. BRONZE BUSH.
HARDENED STEEL FEED GEARS.
STEEL BEVELS.
PATENT FEED MECHANISM
HARDENED WORM
GROUND COLUMN.
STEEL RACK

Stock machines are usually fitted with three-speed cones. They can also be offered with pump and channel cast round table. For description see opposite page.

20-in. "New Century" Vertical Drilling Machines.

Model 402 Single Gear, Model 403 with Back Gear.

These models embody all the latest improvements, the column and arms being cast in one piece ensuring the greatest possible strength and rigidity and the machined portion of the column is ground to within fine limits.

The high carbon spindle is accurately ground and runs in a quill with hardened steel ball thrusts. The three-speed auto-feed change is driven by a high grade chain and is operated by a lever with a positive stop to each position of feed. The patent cross axle feed mechanism for engaging and disengaging the automatic and hand worm feed is almost instantaneous and absolutely positive, allows the use of a fixed work bracket, the worm wheel always being in mesh.

Dimensions.

Distance from centre of spindle to column	10½ ins	Maximum distance spindle to base	42½ ins
Vertical movement of spindle	10½ „	Diameter of table	16½ „
Diameter of quill	2¼ „	Vertical movement of table	22 „
Hole in spindle conforms to Morse Taper No. 3		Dimension of three-speed cone	9, 7, 5×3
		„ „ driving pulley	9×3
Spindle speeds with back gear	30, 54, 98	Speed of driving pulley ..	450
„ „ without „ „	121, 218, 392	Total height	73½ ins
Spindle revs per 1 inch of auto-feed	60, 120, 240	Horse power	2-3
Maximum distance spindle nose to table	31½ ins	Size of base	11×18½×3½
		Nett weight	880 lbs

Model 402 Price, Rs. 1,240.
„ 403 „ „ 1,430.

NOTE.—We stock both of the above models and they can be supplied either with or without the addition of a Suds Pump and Suds channel cast round the tables.

21-in. "Empire" Drilling Machine.

British Made.

This machine is of up-to-date design and suitable for every kind of Engineering Workshop. The Feed Rack and all Worm, Bevel and Spur Gears are correctly generated from solid blanks. The Spindle has two rates of automatic feed, either of which can be easily obtained. The Worm and Back Gear Pinions are **made of steel.** The Spindle is accurately balanced and provided with adjustable stop for automatically releasing the feed mechanism. Adjustable Lever Feed and quick return to the Spindle is provided. Also fine feed through worm gearing and handwheel.

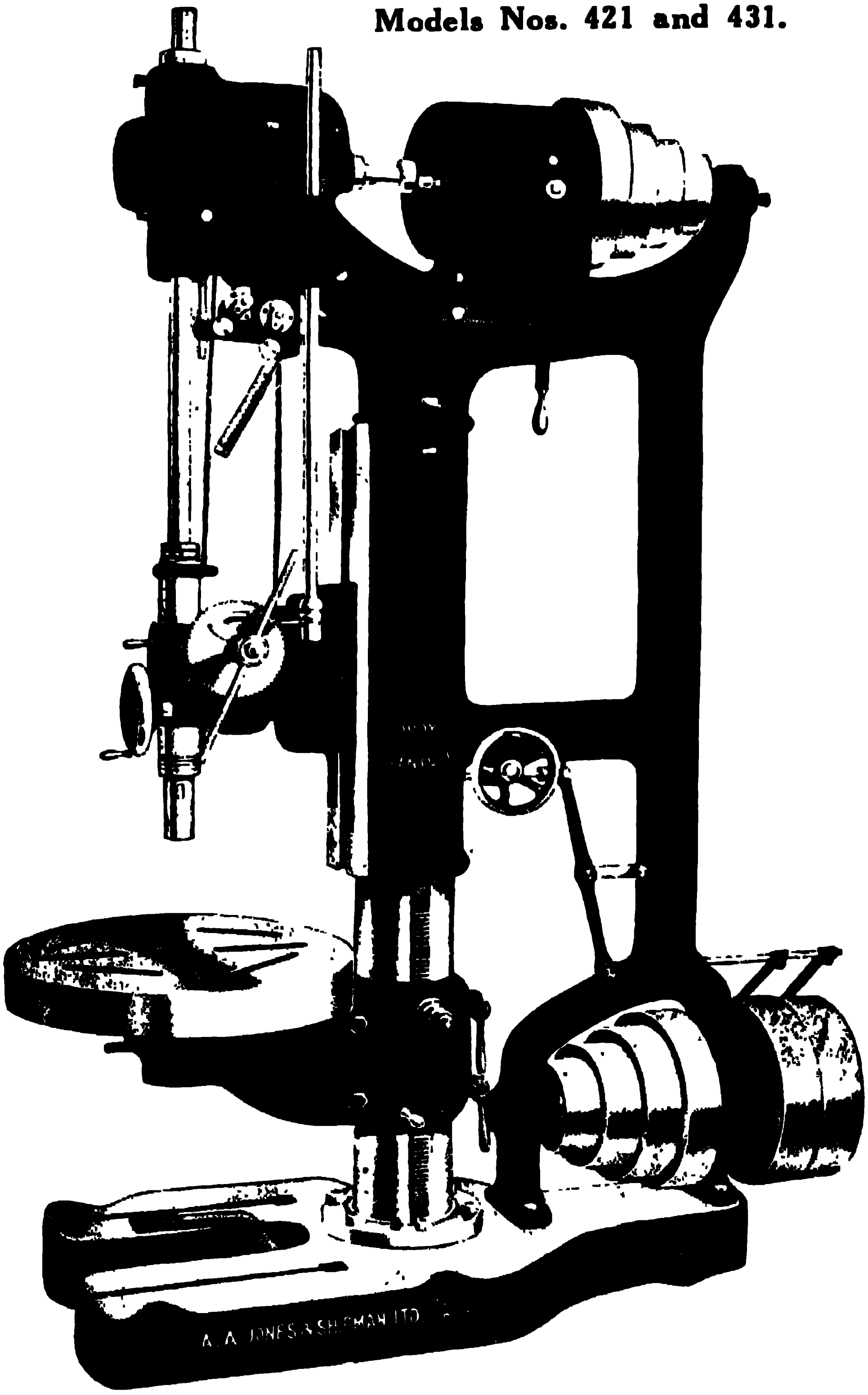
Dimensions.

Distance from column to centre of spindle	10½"	Maximum distance spindle to table ..	29¼"
Vertical feed of spindle with quill ..	8"	Maximum distance spindle to base	40½"
Diameter of spindle in quill	1¼"	Size of base .	30½"×15"
Hole in spindle	Morse Taper No. 3	Total height, floor to top of cone pulley	70"
Spindle speeds with back gear R.P.M. . ..	22, 38, 65, 115	Dimensions of four step cone pulleys	8", 6½", 5", 3½" × 2" wide
Spindle speeds without back gear R.P.M. .	88, 154, 260, 460	Diameter of driving pulleys	8" × 2½" „
Feed of spindle, revolutions per inch .	152, 300 revolutions	Speed recommended for driving pulleys	300 R.P.M.
Diameter of column	5¼"	Approximate weight of one machine ..	620 lbs
„ table ..	15"		
Vertical movement of table	20¾"		

Price, Rs. 600.

27-in. and 30-in. "New Century" Heavy Duty Drilling and Tapping Machine.

Models Nos. 421 and 431.



Examples of Normal Drilling.

Size of Drill. Ins.	Penetration Speed Ins. per min.
1	14½
1¼	9
1½	6¼
2	2¾

For Description—See Opposite Page.

27-in. and 30-in. "New Century" Heavy Duty Drills.

Models Nos. 421 and 431.

Made by Messrs. Jones and Shipman, Limited.

General Description.

The Machine is expressly designed for the heaviest duty.

The Frame is of rigid construction, the column being heavily tied to upright supporting the arm. This arm which carries the geared head and pulley is securely bolted to the column and upright. Strict attention has been paid in the design to provide against any deflection.

The Bearings are gun-metal, ring oiling, the top driving shaft having forced internal lubrication to the cone pulley and back gears.

The High Carbon Steel Spindle is accurately ground and is fitted with high grade Ball Thrust Washers.

The Quill is also accurately ground, is graduated and fitted with a steel rack inserted in a milled groove and is internally lubricated by means of a double spiral groove.

The Six-Speed Automatic Feed change is driven by high speed chain, with two dials indicating the position of the change lever.

The tapping reverse control rod is carried inside the column and is operated by a pedal in the centre of base plate and is detachable.

All auto-feed wheels, worm, bevel, back gear pinion, clutch and driving bevels are steel.

The Table is of a large diameter, well ribbed and is fitted with a suds channel.

The new patented cross axle feed mechanism for engaging and disengaging the automatic hard worm feed. This arrangement while being almost instantaneous and absolutely positive allows the use of a fixed worm bracket, the worm wheel being always in mesh. The merest fraction of a turn on the knurled boss of the worm wheel throws the feed instantly in or out of action.

Model	421.	431.
Size of Machine	27"	30"
Distance from centre of spindle to column	13¾"	15¼"
Spindle diameter in quill ..	2"	2"
Vertical feed of spindle.. ..	15"	15"
Hole in spindle, Morse No. ..	4	4
Spindle speed with back gear ..	16, 25, 40, 64	
" " without back gear	100, 160, 250, 400	
Spindle revs. per 1 inch of auto-feed	28, 40, 58, 80, 115, 168	

Model	421.	431.
Size of Machine	27"	30"
Max. distance spindle nose to table	34"	40"
" " " " " base	49"	56½"
Diameter of table	24"	27"
Vertical movement of table ..	15½"	16½"
" " " head . ..	18"	24"
Dimension of driving pulley ..	16×3⅝"	
Speed " " " R.P.M. ..		400
Nett weight with tapping reverse	21 cwt	25 cwt.
H.P. required	7½"	7½"
Price	**Rs. 4,180,**	**Rs. 4,620**

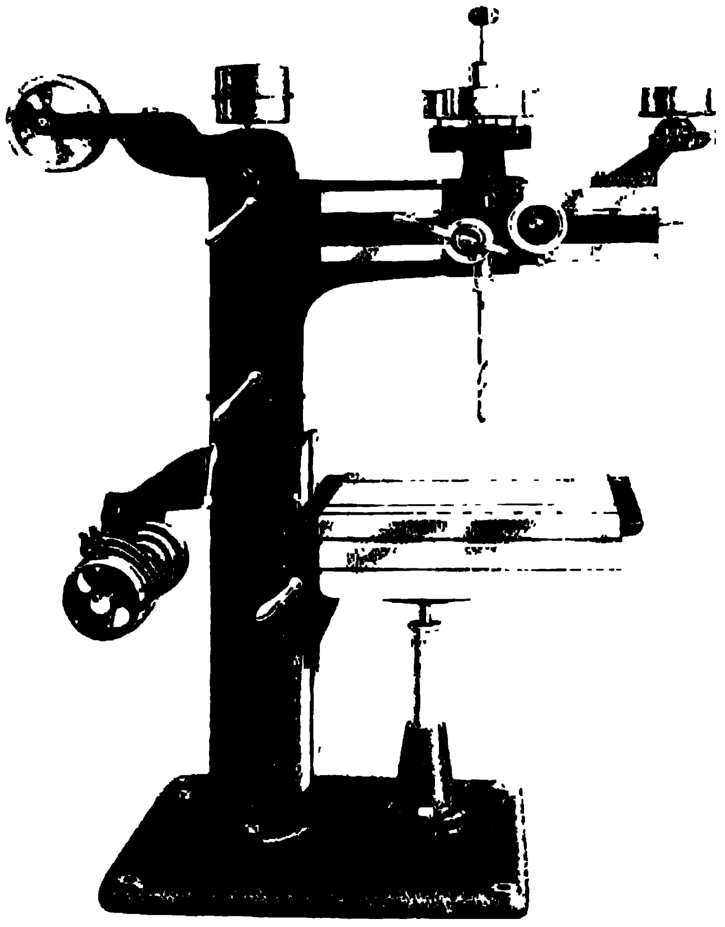
We can also supply a 25-in. drilling Machine which is generally similar to the above and we shall be pleased to give details on application.

We shall be pleased to send particulars and prices for 24-in. "New Century" Ball Bearing Drilling Machines with Tapping Reverse, 25-in. "New Century" High Power Ball Bearing Drilling and Tapping Machines with Tapping Reverse, and for All-geared Pillar Drills on application.

"New Century" Sensitive Radial Drilling Machine.

Light Type Two and Three Feet Radius.

Made by Messrs. Jones and Shipman, Limited.



These machines are designed for rapidly handling all classes of radial drilling up to 1 inch. The operating levers and handles are all placed within easy reach. **The Spindle** is high carbon steel accurately ground and fitted with ball thrust bearings in both types of the machine. **The Spindle Bracket** is mounted on a wide slide, and is traversed very quickly along the arm, and may be locked securely in any desired position. **The Lateral Traverse** is through hand wheel, steel rack and pinion. **The Top Drive,** through a long endless belt, gives a very powerful drive to the spindle. **Screw Adjustment** is provided for tightening the belt. **The Arm** is a rigid semi tubular section, and arranged to swing very easily through an arc of 180°. **The Column** is accurately ground to take the arm. **The Table** is raised and lowered by hand wheel and telescopic screw, and is secured to the accurately machined vertical slide on the column. Standard Tee Slots are provided on the top and side of both tables.

The Countershaft is self contained with the machine and is provided with very handy belt shifting device, operated by machine cut rack and sector through a hand lever. **The Base** is widespread and on both types is cast in one piece with the column.

Dimensions.

Diameter of Spindle	1⅛ ins.
Spindle Bore Morse Taper	No. 2
„ Feed	5 ins.
Nose to Table —Maximum	28 „
—Minimum	5 „
Table Top	23 ins.×21 ins. and 35 ins.×21 „

Table Side	23 ins ×6½ ins and 35 ins ×6½ ins
Table Vertical Movement	18 „
Maximum Radius	24 ins. or 36 „
Minimum „	4 „
Approximate Weight	1,020-1,200 lbs

Price, 2 ft. Radius, **Rs. 1,225.**

Price, 3 ft. Radius, **Rs. 1,400.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

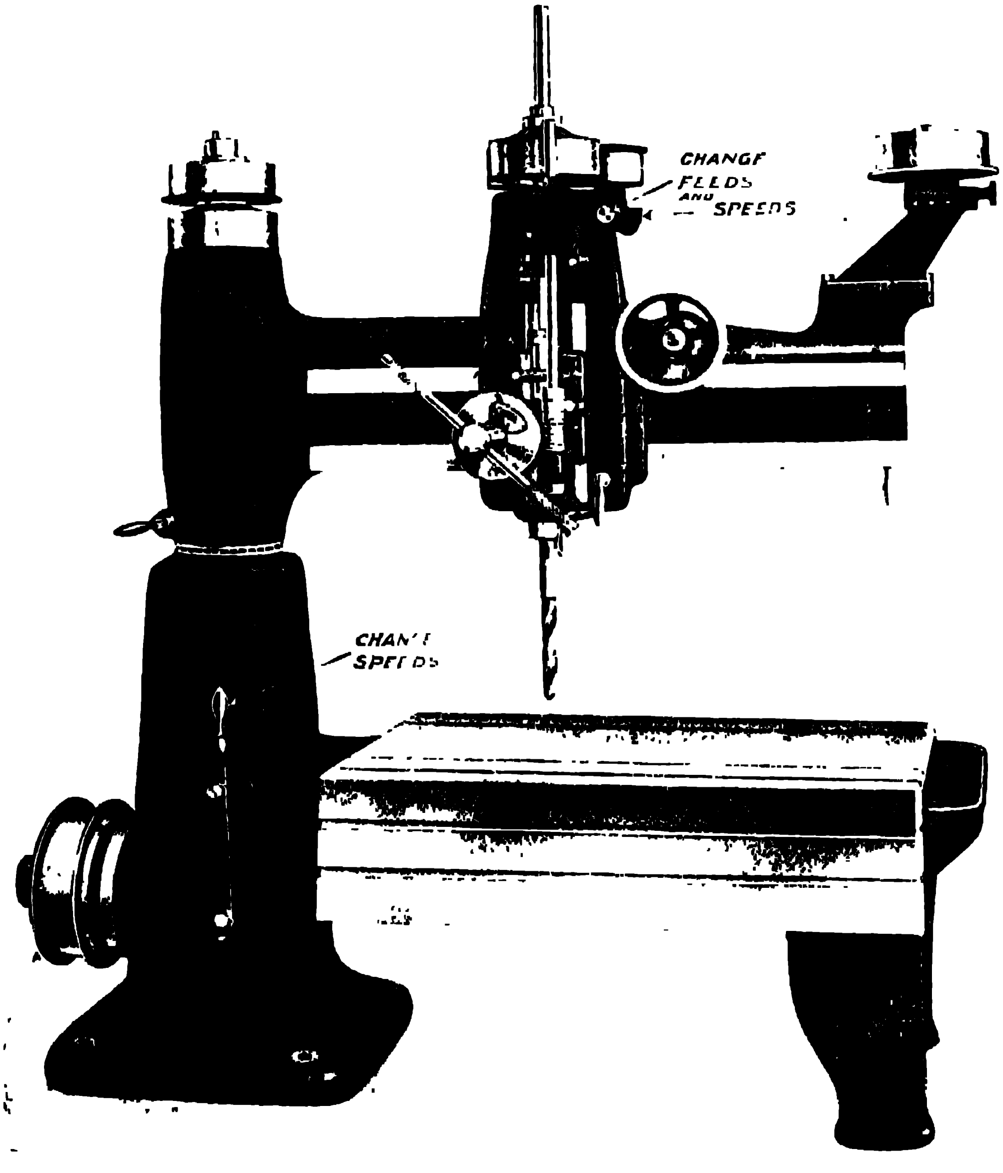
RANGOON, MADRAS,
BOMBAY, LONDON.

3-ft. and 4-ft. "New Century" Constant Drive Ball Bearing Sensitive Radial Drilling Machines.

With J. & S. Patent Geared Pulley.

Made by Messrs. Jones and Shipman, Limited.

These machines run on Ball Bearings throughout and are of extremely massive construction, designed to resist spring or deflection under drilling strain. The Spindle Pulley is fitted with Epicyclic Differential Reduction Gear to maintain a constant belt velocity. Reduction gears are fitted to the main driving shaft by which the power in the drill spindle can be increased five times. All speed changes can be instantly obtained The Drill Spindles are fitted with the makers' new Patented cross axle feed mechanism for instantly engaging and disengaging the Automatic and Hand Feeds. By this arrangement the merest fraction of turn on the knurled boss on the worm wheel throws the feed immediately in or out of action. The Radial arm revolves on a ground trunnion and the weight taken on Ball Bearings. The Table is of ample dimensions, well ribbed, and with the slots on top and both sides.



Specifications.

Spindle, Diameter	1¼ ins.	Table Top 3 ft. Radial	42 ins by 20 ins.
Bored Morse Taper	No. 3	„ Side 3 „ „	42 „ „ 10½ „
Vertical Traverse	8 ins.	„ Top 4 „ „	54 „ „ 20 „
Nose to Table	19 „	„ Side	54 „ „ 10½ „
„ „ Floor	44 „	Appro	2,250 2,800 lbs.
Speeds 237|1,200	4 „		

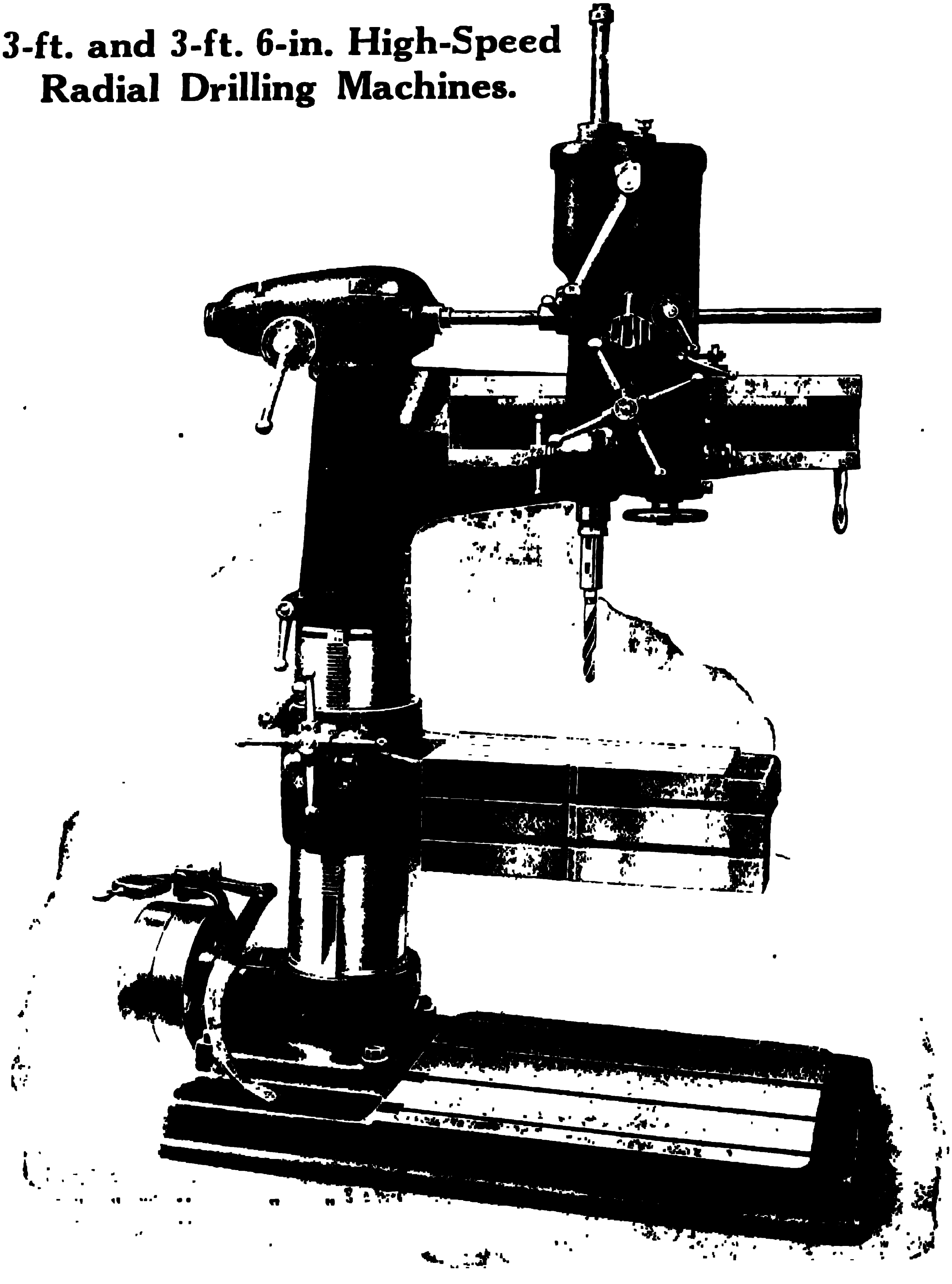
Price, 3 ft. Radial, Rs. 4,250. **Price, 4 ft. Radial, Rs. 4,550.**

CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW.

JESSOP & Co LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON

3-ft. and 3-ft. 6-in. High-Speed Radial Drilling Machines.



3-ft. and 3-ft. 6-in. High-Speed Radial Drilling Machines.

The machine is designed and built on the latest principles, special attention having been paid to rigidity and easy manipulation, all operating levers being placed within easy reach of the operator.

The machine has the combined advantages of the Low Base and Box Bed machines, as work can be bolted on the top or front face of the Swing Table, which can be swung out of the way for bolting large work on the Base.

The Saddle carrying the spindle is of simple design, all working parts being reduced to a minimum. The main casting is in one piece enclosing the driving and feeding mechanism The thrust of the spindle is taken up by ball thrust bearings.

A Separate Feed Box is eliminated by embodying the three changes of positive feed in the saddle itself, over a carefully chosen range obtained by sliding gears, no sliding keys being used throughout the machine.

The Gear Box is of the sliding gear type having four changes of speed which, together with the double gear on the saddle, give eight spindle speeds

The Arm is of oval section and is of exceptional sturdy design The rotary motion of the arm is made exceptionally easy by means of a ball thrust bearing at the top of the pillar

The Pillar is of large proportions, the metal here being distributed to give the greatest resistance to the upward thrust of the drill when on heavy duty

The Base or Table is provided with necessary tee slots on top and front side, all of which are machined from the solid, whilst internally, ribs are distributed, ensuring perfect rigidity

The Reverse Motion for tapping is embodied in the saddle design and provides for the tap withdrawing at four times the tapping speed. The reverse motion is of such a design as to eliminate all semblance of shock.

All Shafts are of suitable steel and revolve in phosphor bronze bearings which are self-lubricating.

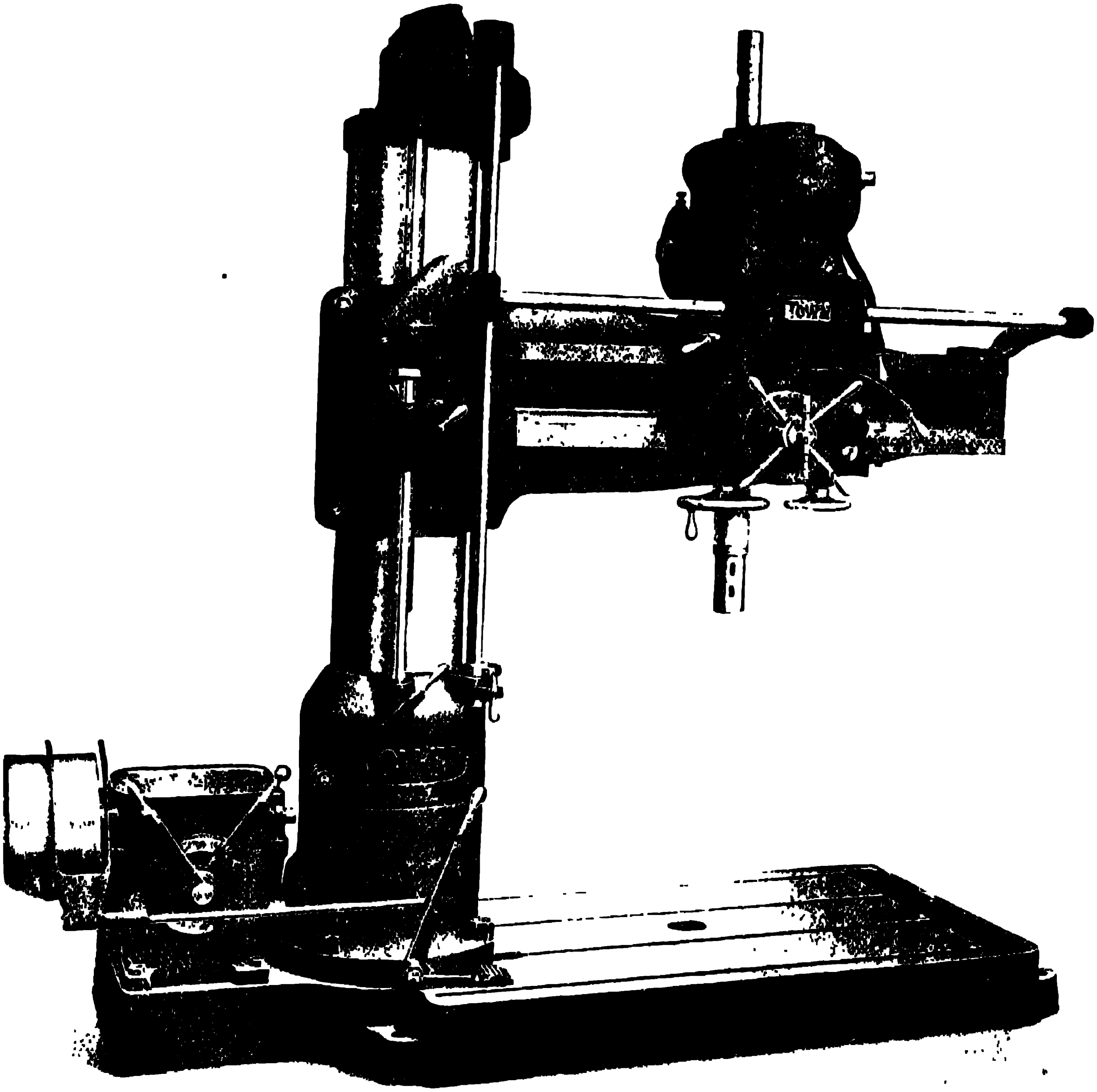
All Gears are of high carbon steel and are machine cut from the solid

All Clutches are of high carbon steel and are case hardened

Dimensions.

Maximum Radius	0"	3' 6"
Saddle Travel along Arm	10"	2' 4"
Maximum Distance, Spindle Nose to Edge of Pillar	6"	2' 6"
" " " " top of Swing Table	6"	2' 6"
Elevation of Swing Table	1' 6"	1' 6"
Maximum Distance, Spindle to Base	4' 0"	4' 0"
Diameter of Pillar where Table fits	10½"	10½"
" " " Arm "	8½"	8½"
Working Face of Swing Table .	29½"×14½"×10½"	[illegible]"×14½"×10½"
" " Low Base . .	36"×30"	42"×30"
Dimensions of Pulleys	14"×3½"	14"×3½"
Speed of Pulleys ..	500 R. P. M.	500 R. P. M.
Number of Spindle Speeds	8	8
Spindle Speeds .	45 to 500 R. P. M.	45 to 500 R. P. M.
Diameter of Spindle	2"	2"
Bore of Spindle, Morse Taper	No. 4	No. 4
Length of Spindle Feed	12"	12"
Rates of Spindle Feed .. .. revs. per inch.	48, 78, 128	48, 78, 128
Total Overall Floor Space	69"×32"	75"×32"
Approx. Nett Weight	30 cwts	32 cwts.
Price .. .. Rs.	**2,500**	**2,700**

4-ft. 6-in., 5-ft., 5-ft. 6-in., and 6-ft. High-Speed Radial Drilling, Boring, Tapping and Studding Machines.



.ow Base Type.

4-ft. 6-in., 5-ft., 5-ft. 6-in. and 6-ft. High-Speed Radial Drilling, Boring, Tapping and Studding Machines.

The Spindle is of high carbon high tensile steel accurately ground, and is carried in a hard steel sleeve ensuring firm support when out at maximum traverse, and is balanced by compensating spring device. The feed rack is cut in the sleeve, at the bottom of which are fitted ball thrust washers for taking drilling thrust. The variable self-acting feed motion has four correctly graduated rates of feed provided through enclosed gearing, and improved powerful friction clutch. Any one of the four rates of positive feed can be used in conjunction with any of the spindle speeds. Slow hand feed for fine adjustments of the spindle is operated by hand wheel at bottom of saddle

The Saddle is of box bed form with all mechanism totally enclosed, and is accurately bedded to arm on ample bearing surfaces It is arranged to traverse freely along radial arm by steel rack and pinion operated by hand wheel.

The Arm is of strong tubular section designed to give maximum resistance to the drilling stresses and has a special slipping device to prevent over-running The arm will swing the complete circle with the exception of belt interference

The Sleeve carrying radial arm is of strong cylindrical section with good bearings on pillar upon which it can be easily rotated on ball bearings.

The Gear Box is of improved design, changes being effected by sliding steel gears operated by levers in front of box Nine speeds are obtainable in the box and with the double gear on the saddle, a total of 18 spindle speeds are obtained.

The Base-plate is of strong section, well ribbed, accurately planed on top and underneath with **T** slots in top planed from solid for holding work, and is provided with a hole in centre to enable clients to make their own provision for boring bar steadies

The Gearing throughout is machine cut from the solid, mitre and bevel gearing being accurately planed for smooth running at high speeds.

The Driving Gears and Shafts are of special high carbon steel and all principal bearings are bushed with special bronze except where ball journals are used.

Dimensions.

Sizes

	4' 6"	5' 0"		6' 0"
Maximum Radius of Drill Spindle	4' 6"	5' 0"	5' 6"	6' 0"
Traverse of Saddle along the Arm	3' 1"		4' 1"	4' 7"
Diameter of Spindle .	2"		2¼"	2¼"
Spindle Bored to Morse Taper . .	No 5.	No	No 5.	No 5.
Feed Traverse of Spindle, Hand and Self-Acting	17"	17"		17"
Maximum Distance Spindle to Base plate	4' 6"	4' 6"		5' 6"
Vertical Movement of Arm	28"	27"		37"
Spindle Speeds—Number	18	18		18
„ „ —Range ..	500—19	500—19	500—19	500—19
Number of Positive Feeds . ..	4	4	4	4
Range of Feeds—Cuts per inch .	30 to 120	30 to 120	30 to 120	30 to 120
Base-plate—Depth . .	7½"	9"	9"	9"
„ —Working Surface—Length ..	4' 6"	5' 0"	5' 6"	6' 0"
„ „ „ Width ..	3' 0"	3' 4"	3' 8"	3' 8"
Driving Pulleys Dimensions ..	14"×4⅛"	14"×4⅛"	14"×4⅛"	14"×4⅛"
„ „ —Speeds	455 R. P. M	455 R. P. M	455 R. P. M	455 R. P. M
Total Height—Floor to Top of Spindle .	10' 2"	10' 4"	11' 4"	11' 4"
Actual Floor Space	9×3' 0"	9' 6"×3' 4"	10"×3' 8"	10' 6"×3' 8"
Approximate Net Weight . .	65 cwts.	74 cwts.	80 cwts.	85 cwt
Price .. .. . Rs.	**6,130**	**6,670**	**7,530**	**8,170**

A loose table planed on top, underneath, and front side, with planed **T** slots on top and front can be supplied at extra cost.

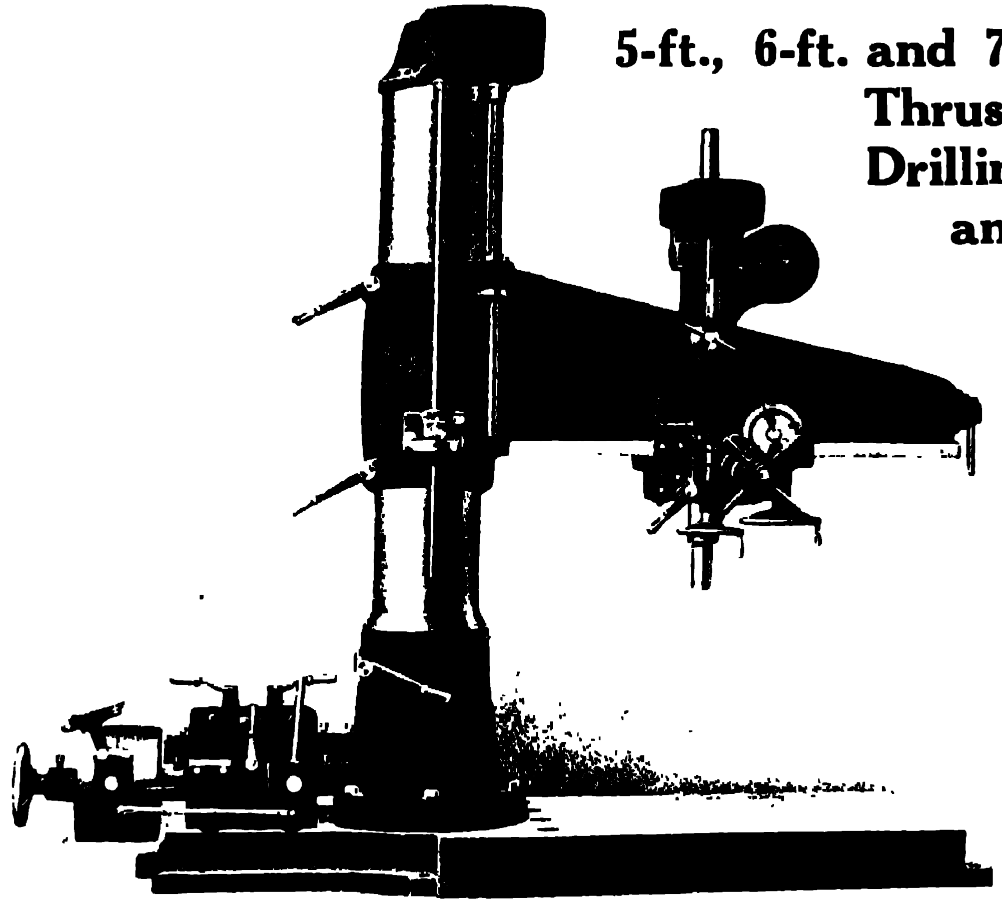
Prices for **Box Bed Machines** on application.

CALCUTTA, JAMSHEDPUR.
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

5-ft., 6-ft. and 7-ft. Central Thrust Radial Drilling, Tapping and Studding Machines.



These high-class machines have been designed to meet the demand for a machine to be very rigid under the severest duty, to deal with high speed drills at their utmost speeds and feeds, and to be easy in manipulation in all movements.

Complete specification will be forwarded on application.

Dimensions.

	Sizes		
Maximum Radius, Centre of Column to Centre of Spindle	5' 0"	6' 0"	7' 0"
Minimum " " " " " " "	1' 9"	1' 9"	1' 9"
Distance, Front Edge of Pillar to Centre of Spindle	3' 9"	4' 9"	5' 6"
Admits between Base and Spindle Maximum	5' 0"	5' 0"	5' 6"
" " " " Minimum	7"	7"	10"
Rise and Fall of Arm	3' 3"	3' 3"	3' 5"
Diameter of Column	15"	15"	18"
Feed of Spindle	14"	14"	18"
Diameter of Spindle	3"	3"	3½"
Number of Feeds to Spindle	8	8	8
Revs of Spindle per inch of Feed	30 to 120	30 to 120	30 to 120
Number of Spindle Speeds	16	16	16
Speeds of Spindle	19 to 390	19 to 390	19 to 390
Driving Pulleys Dimensions	16"×5"	16"×5"	16"×5"
" " —Speeds	400 R. P. M.	400 R. P. M.	400 R. P. M.
Size of Base-plate—Working Surface	4' 9"×3' 0"	5' 9"×3' 0"	6' 2"×3' 6"
" " " —Overall	9' 8"×3' 3"	10' 8"×3' 3"	11' 6"×3' 8"
Approx. Overall Dimensions	10' 8"×3' 3"	11' 8"×3' 3"	14' 0"×3' 8"
" Nett Weight	6 tons.	6¼ tons.	8 tons.

Prices on application.

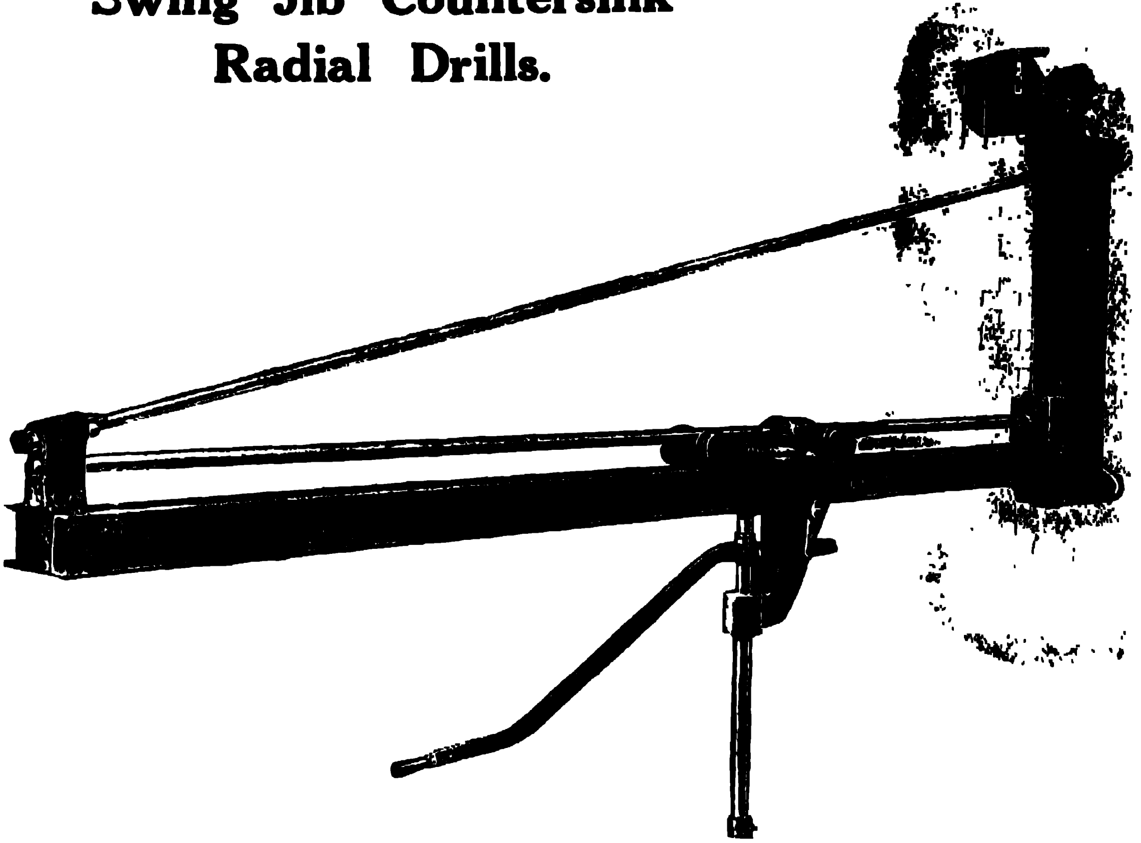
A loose Box Table can be supplied at extra cost.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS.
BOMBAY. LONDON.

Swing Jib Countersink Radial Drills.



These machines have been specially designed for dealing with the large plates now used in Bridge and Shipbuilding. Plates can be easily drilled and countersunk at one setting by means of the long lever, which serves to locate the position of the spindle and gives leverage for the necessary pressure.

Wall Plate. A strong cast-iron wall plate is provided which can easily be bolted to the wall or a vertical pillar.

The Trunnion Bearings are formed on the wall plate to carry the trunnion which is capable of a revolution of 180 degrees and carries with it the jib girders.

Carriage is of simple and efficient design. The traverse wheels have anti-friction roller bearings and all steel machine cut gears. The Spindle has ball thrust washers and the return is by a long coiled spring.

The Channels which form the longitudinal supports are of rolled steel

The Drive. The pulleys for driving are arranged at the top of the Wall Plate and are so arranged that they can be set at an angle to the Wall.

Dimensions.

	No. 1.	No. 2.	No. 3.	No. 4.
Length of Jib .	6′ 0″	9′ 0″	14′ 0″	18′ 0″
Height from Floor to Jib .	6′ 9″	6′ 9″	6′ 9″	6′ 9″
Spindle Diameter .	2″	2¼″		
Size of Plate covered by one Machine	5′ 0″×2′ 0″	10′ 0″×2′ 6″	18′ 0″×5′ 0″	24′ 0″×8′ 0
.. „ Pulleys .	12″×3½″	12″×3½″	16″×4″	16″×4″
Revs. per Minute .	340 R. P. M.	340 R. P. M.	380 R. P. M.	380 R. P. M.
Approx. Nett Weight .	12 cwts.	18 cwts.	24 cwts.	32 cwts.

Prices on application.

These machines can also be arranged for electric drive, and are supplied either with or without motor.

CALCUTTA. JAMSHEDPUR.
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Heavy Duty Crank Shaping Machine.

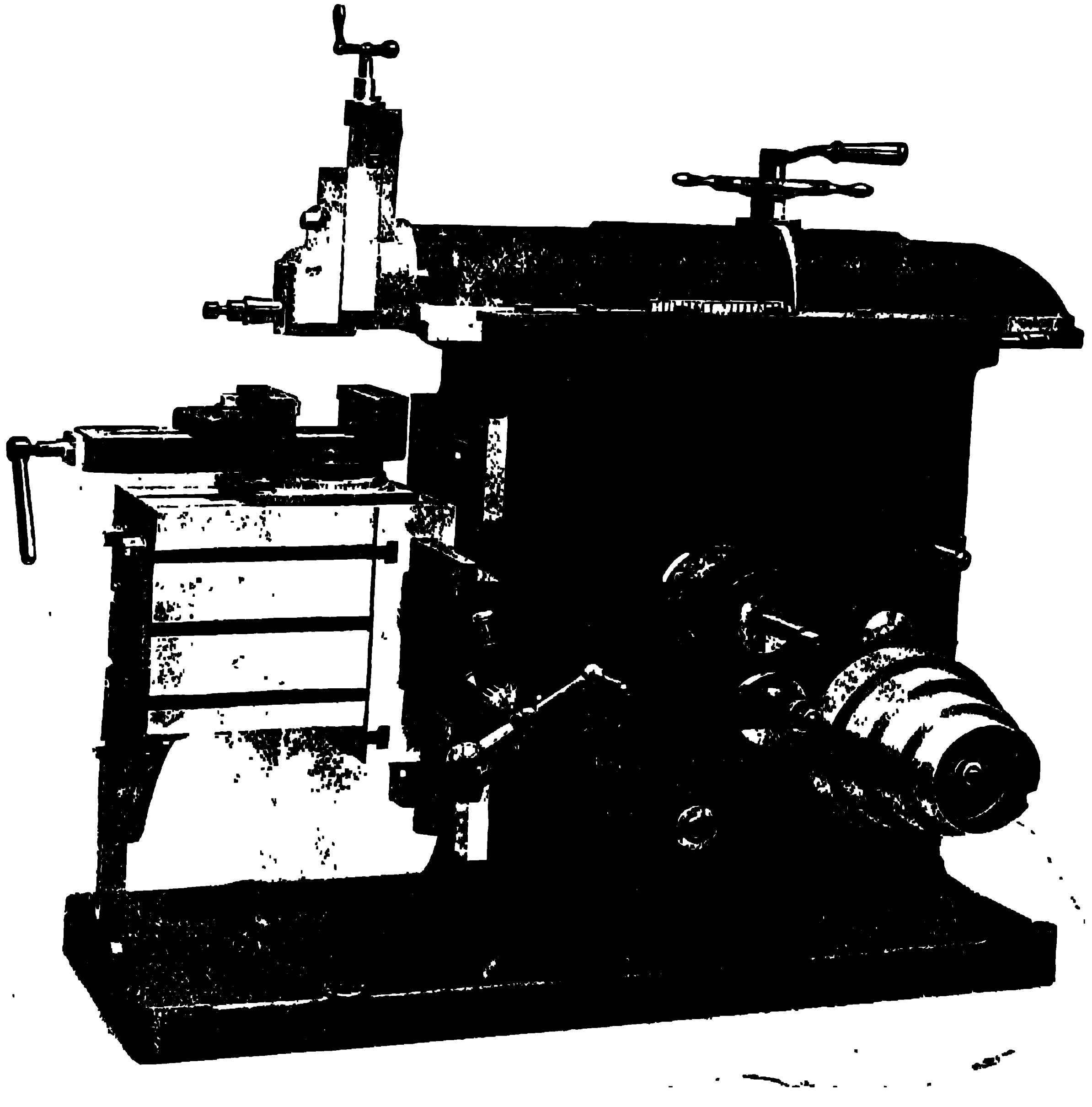


Illustration of 16-in. Machine.

On the opposite page we describe a complete range of Crank-driven Shaping Machines, designed after a careful study and experience of Shaping Machine Manufacture extending over a period of years. They are of massive construction throughout, capable of taking advantage of modern high-speed steels, special attention having been given to ensure rigidity under the heaviest cuts.

All parts are manufactured in quantities by modern machinery under strict inspection during progress, and each machine is thoroughly tested in actual work before despatch.

Heavy Duty Crank Shaping Machine.

(For Illustration See Opposite Page.)

General Description.

The Column is of large proportions, strongly ribbed to ensure great rigidity. The slide in which the ram works is exceptionally long, giving the maximum ram bearing in all positions of stroke. An adjustable taper strip is provided to take up wear.

The Ram is of very strong section, and is centrally driven by a crank motion, which gives a quick return. The crank block is arranged to take up wear. The adjustment of ram is quickly effected by the handwheel placed on the same centre as the locking handle. The serrated ram plate prevents slip under cut.

Shafts may be passed through the body of the machine for key-seating.

The Tool Head has taper strip adjustment to vertical slide, and swivels through an arc of 180 degrees. It can be fitted with self-acting feed for vertical or angular work, and with worm and quadrant tool box when desired at extra cost.

The Feed Screws for head and table are graduated for fine adjustments.

The Table is fitted with self-acting horizontal traverse, operating in either direction. It is raised or lowered by means of worm and screw, the friction being taken on ball thrust washers. The table is detachable to enable large castings to be bolted to the apron slide, except when revolving table is fitted.

The Vertical and Horizontal Slides carrying the table are fitted with adjustable strips to take up wear.

The Stroke can be altered whilst the machine is in motion, and a graduated index is provided showing the length.

The Cones are arranged to give the changes of ram strokes in geometrical progression. In all sizes the driving shaft has an exceptionally long bearing, to prevent wear, due to belt pull.

All Bearings are well lubricated, have cast-iron removable bushes, and all shafts are ground between dead centres.

The Crank Pin and Slide carrying the link block is one solid steel casting, the slide is fitted with adjustable strip to compensate for wear.

All Wheels and Tee Slots are machine-cut from the solid, and where necessary are made from steel.

The Vice is of special design, with one fixed and one swivel jaw fitted to a graduated swivel base.

The Overhead Motion is fitted with self oiling swivel bearings of large proportions.

Standard Equipment.—Overhead Motion, Vice, Handles and Spanners.

Leading Dimensions.

Type	Single Geared	Single Geared	Back Geared
Size of Machine	9"	13"	16"
Maximum Length of Stroke	10"	14½"	18"
Horizontal Traverse of Table	18"	20"	22"
Maximum Distance Table to Ram	16"	18"	18"
Minimum " " " "	3"		4"
Feed of Tool Box	5"		6"
Size of Tools (when supplied)	8" × 1" × [illegible]"	9" × 1¼" × [illegible]	9" × 1¼" × [illegible]"
Length and Width of Table Top	13" × 10"	16[illegible]" × 1[illegible]	17" × 12"
" " Depth of Table Side	9" × 10"	12" × 12"	13" × 13"
Number of Speeds to Ram	4	4	8
Ratio of Gears	6 to 1	9½ to 1	[illegible] to 1 and 21 to [illegible]
Number of Ram Strokes per Minute	28 to 86	20 to 68	10 to 120
Diameter and Width of Overhead or Gear Box Pulleys	10" × 2[illegible]"	11" × 3[illegible]"	12" × 3[illegible]
Speed of Overhead or Gear Box Pulleys	300 R.P.M	350 R.P.M	350 R.P.M.
Approximate Weight	14 cwts.	19½ cwts.	28 cwts.
Horse Power required	2 H.P.	2½ H.P.	3½ H.P.
Price Rs.	1,900	2,385	2,800

Prices for large sizes on application.

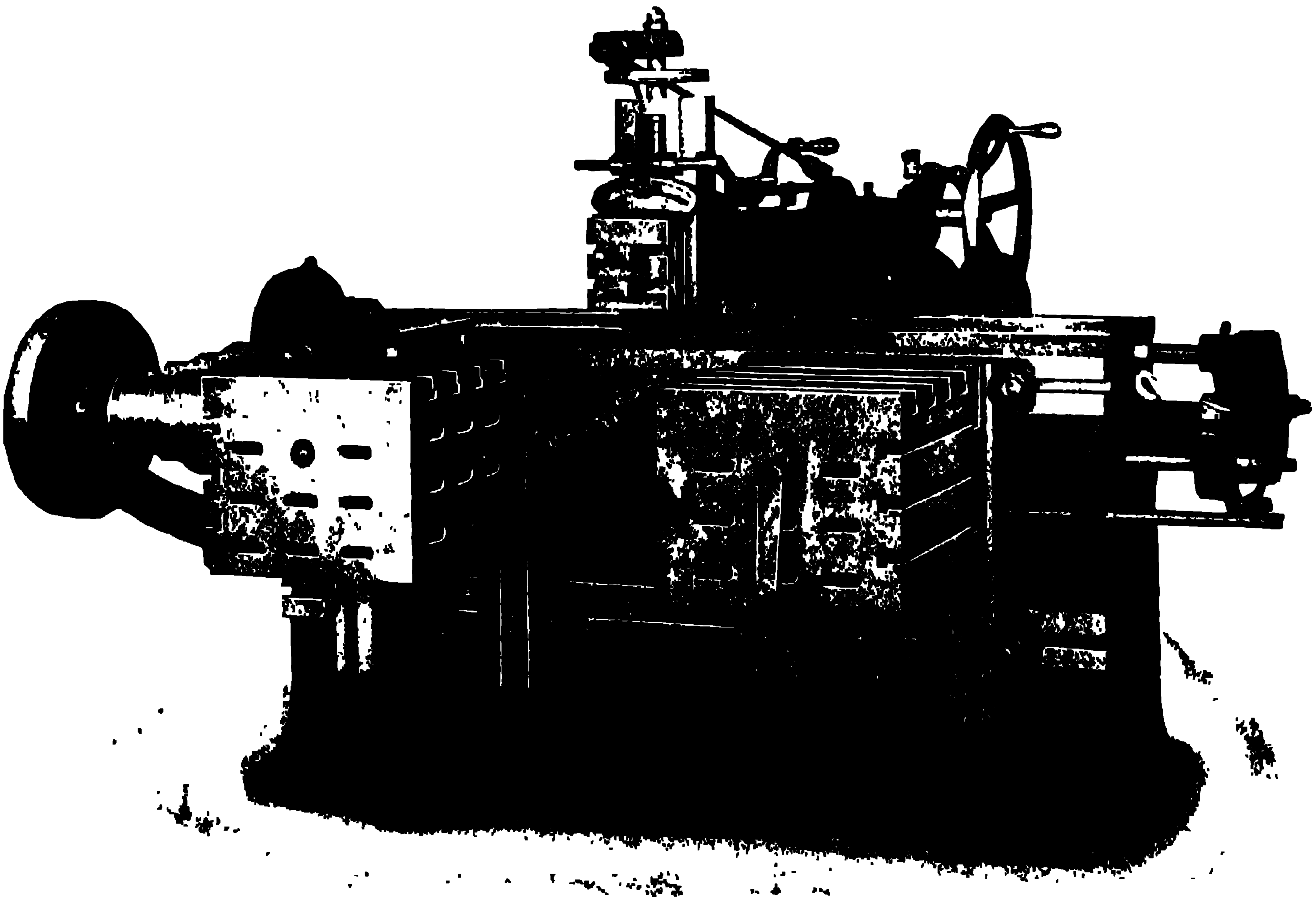
CALCUTTA, JAMSHEDPUR, DELHI. LUCKNOW,

JESSOP & Co. LTD ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON

14/16-in. Shaping Machine.

Travelling Head.



The Bed is of massive design, box section carried to ground, accurately planed and surfaced, and has large Vee Slides planed and scraped for **Traversing Head. The Carriage** which carries the ram has automatic traverse in both directions and has quick hand adjustment along bed by means of large hand-wheel. **The Ram** motion is arranged for quick return, and the sides of the ram is designed to prevent any distortion in Vee Slides during cutting stroke. **The Tool Box** can be swivelled to any angle and has variable automatic feed and with the automatic feed to the carriage has variable and self-acting feeds in both horizontal and vertical directions, worm and quadrant being fitted for curved work. **The Table** is box form with securing bolts to apron which is moved longitudinally along the bed by a screw at end of bed and the elevating screw is fixed in the apron side and does not protrude at any time. **A Circular Mandrel** with automatic feed is fitted, the table carrying an outer support for same. **The Equipment** includes one swivel vice, necessary tools and spanner, and countershaft.

Length of Stroke	14/16″	Number of Tables	2
Vertical Feed Tool Box	6″	Size of Tables	17″ × 15″ × 13″
Length, Bed	72″	Speed of Countershaft	250
Longitudinal Traverse of Head	54″	Floor Space occupied	9′ 6″ × 6′ 8″
Admits between Tool Box and Table	15″	H. P. required	3½
Number of Steps on Cone Pulley ..	4	Approximate Weight	42 cwts
Largest Diameter and Width of Cone Pulley	12¼″ × 3½″		

Price, Rs. 4,480.

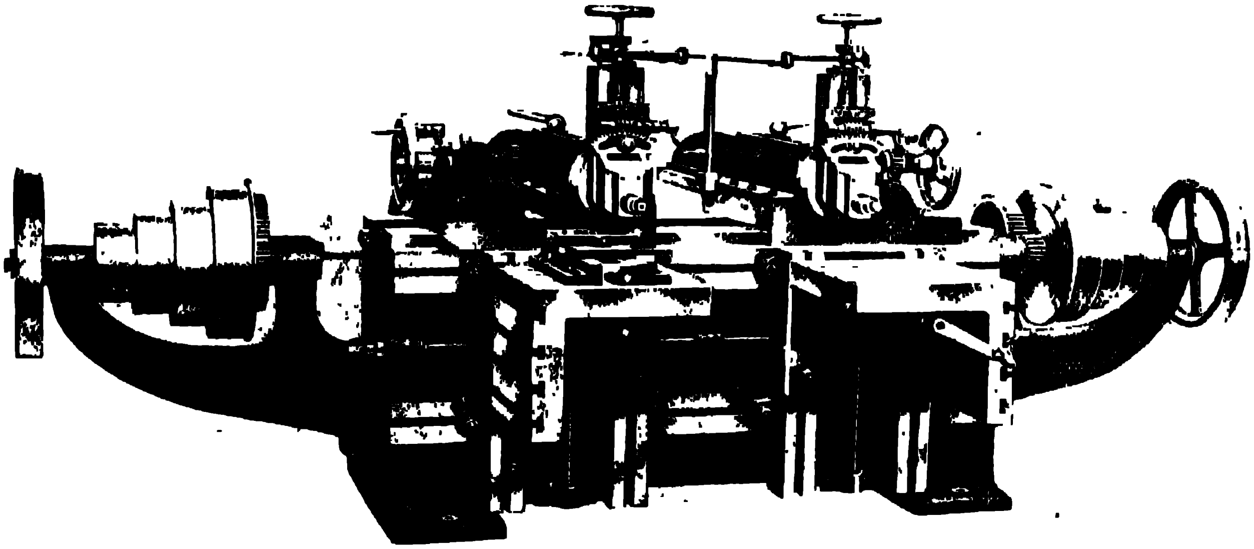
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Traversing Head Type Shaping Machines.

(Two Heads and Two Tables.)



The Bed is of massive design, strongly ribbed to prevent deflection. It is accurately planed and finished by hand scraping.

The Headstocks are fitted with self-acting motion, quick adjustment may readily be made by means of handwheels conveniently placed. Each Headstock is driven independently, both as regards the stroke of ram and feed motions.

The Rams are graduated, and centrally driven by means of a slotted link, giving a quick return stroke.

The Tool Heads are fitted with worm and quadrant tool boxes, also with self-acting feeds.

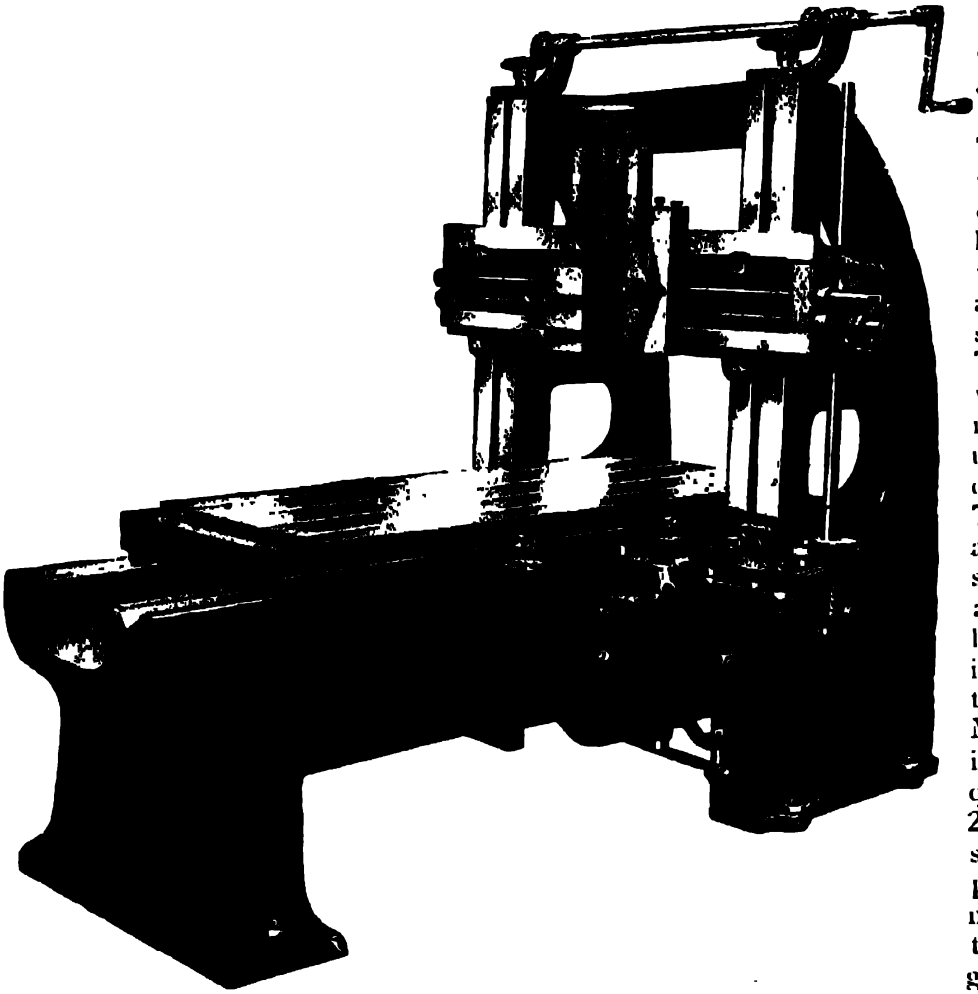
The Tables are of strong box, right and left hand angle section.

Standard Equipment.—Overhead motion to each headstock, one vice, necessary working handles and spanners.

Dimensions.

Length of Stroke	10"	12"	14"	18"
" " Bed	8'-0"	10'-0"	10'-0"	10'-0"
Width " "	1'—0½"	1'—2½"	1'-6"	1'-10"
Depth " " .		2'-10"		2'-10"
Feed of Tool Box ..	5"	6"		7"
Maximum distance of centres of Tools .	6'-0"	7'-6"	0'	6'-6"
Minimum distance of centres of Tools . .	1'-3"	1'-3"	1'-5	1'-6"
Length, width and depth of Tables	12" × 11" × 9½	6" × 13½" × 12½"	18" × 15½" × 14"	20" × 18" × 16"
Maximum distance Table to Ram	10½"	12½"	12½	1'-6"
Diameter of Speed cones .	11" to 5"	12" to 7"	14" to 8	18" to 9"
Width of Speed cones . .	2½"	2¾"	3½	4"
Number of Speeds of Ram ..	4	4	4	1
Diameter and width of Overhead Pulleys	10" × 2½"	12" × 3"	14" × 3½"	16" × 4"
Speed of Overhead Pulleys, R P M	200	280	230	160
Vice admits in length .. .	6"	8"	9"	9"
Width and depth of Vice Jaws .	4¾" × 1½"	6½" × 2"	8¼" × 2"	8½" × 2"
Floor Space required .	13' × 5'	15'-6" × 5'—0"	16' × 6'—6"	17' × 7'-6"
H.P. required for each Head stock	2½	3	3½	
Approximate nett weight ..	48 cwts	60 cwts	75 cwts	100 cwts
Price, with standard Equipment ..	**Rs. 4,160**	**Rs. 5,360**	**Rs. 6,560**	**Rs. 8,280**

Improved Self-acting Planing Machines.



This Type of Planer is of simple design, easy to operate, and of solid construction, requiring no countershaft.

The Beds are made with strong sides, braced together by deep box bars, for greater rigidity and with Vees accurately planed and surfaced.

The Tables are made with T slots longitudinally cut from the solid, unless specially ordered otherwise

The Driving Wheels are all spur gears, extra strong, and without any stud wheel; a large Idle Wheel works in rack to move the table in the 3 feet Machine. The Gearing is arranged on the quick return motion of 2½ to 1 times. The self-acting feed, stopping and starting motion are all outside the Machine, easy to get at and strong and well made in all parts. All feed wheels and levers are steel.

The Standards are hollow frame castings firmly and truly bolted to sides and beds, and brought down to floor line in all sizes.

The Cross Slide is of strong section and fitted with strong saddle and tool box, self-acting in the horizontal, vertical and angular cuts.

All Gearing Throughout, including rack, supplied with these Planers, are machine cut.

The Driving Pulleys are of large diameter and ample power, with Pulley shaft bracket fixed to Standard, making the whole self-contained.

Dimensions.

Nos.	Dimensions						Size of Table				Approx. Nett Weight			Price with one Tool Box.	Price with two Tool Boxes.
	Length.		Width.		Height		Width		Centre of V.'s.		Size of Pulleys	With one Tool Box.	With two Tool Boxes.		
	ft.	in.	ft.	ins	ft.	ins.	ft.	ins	ft.	ins.	ins ins.	cwts.	cwts.	Rs.	Rs.
21	3	0	1	8	1	8	1	4	0	9½	13 × 2½	23	Not made.	2,185	...
22	4	0	2	0	2	0	1	8	1	2½	16 × 2½	37	40	2,690	3,080
142	6	0	2	0	2	0	1	8	1	2½	16 × 2½	45	46	3,025	3,420
23	6	0	2	6	2	6	2	1	1	4	18 × 2½	59	63	3,585	4,035
143	8	0	3	0	3	0	2	6	1	7	30 × 3	88	92	5,628	5,880

Particulars of larger sizes on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

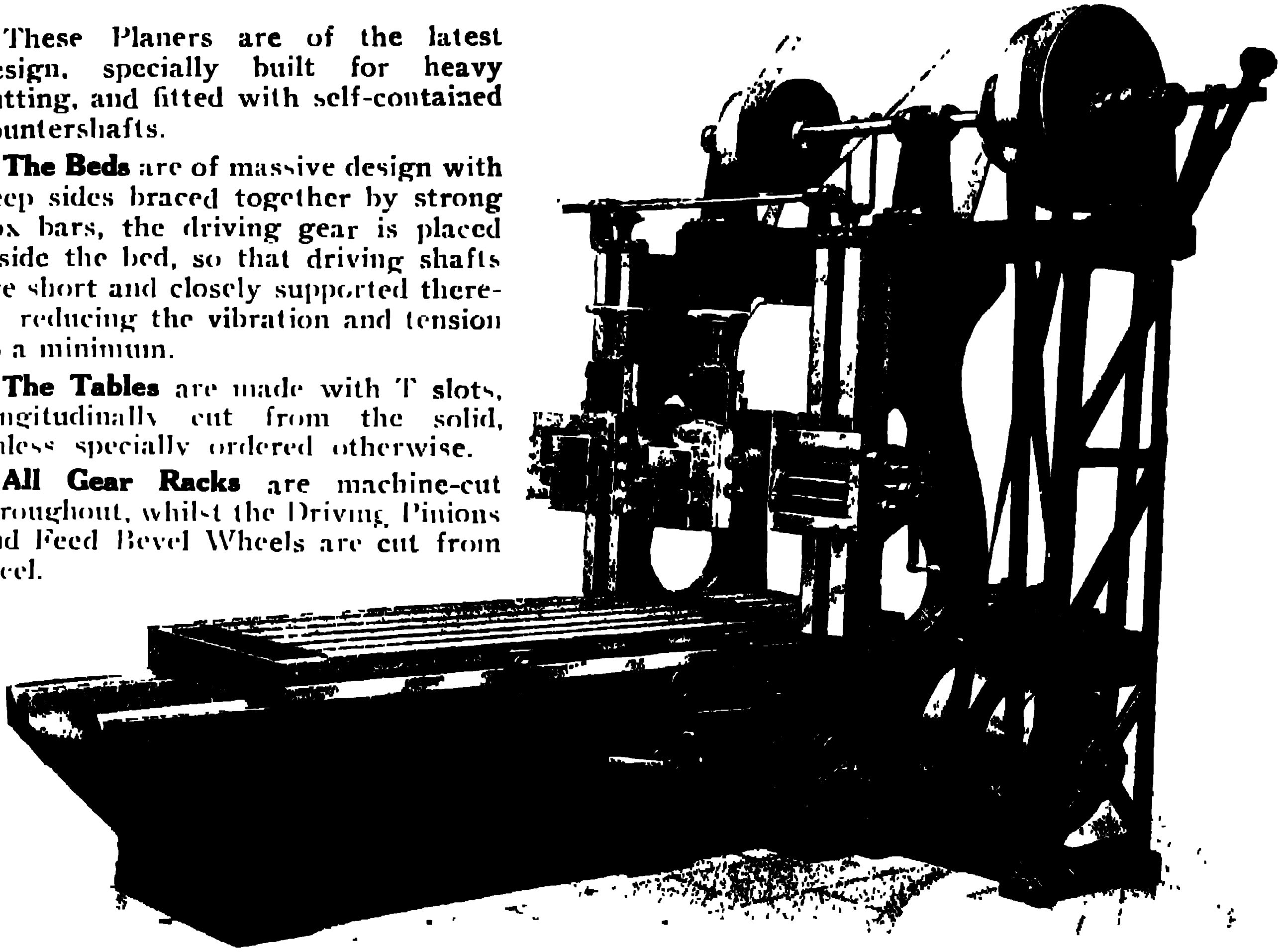
Two-Belt Type Planing Machines.

These Planers are of the latest design, specially built for heavy cutting, and fitted with self-contained countershafts.

The Beds are of massive design with deep sides braced together by strong box bars, the driving gear is placed inside the bed, so that driving shafts are short and closely supported thereby reducing the vibration and tension to a minimum.

The Tables are made with T slots, longitudinally cut from the solid, unless specially ordered otherwise.

All Gear Racks are machine-cut throughout, whilst the Driving Pinions and Feed Bevel Wheels are cut from Steel.



The Standards are hollow frame castings, built suitable to withstand heavy cuts, and are securely keyed and bolted to the bed.

The Cross Slide is of strong section with wide bearing surfaces, and has square guide on the top side and vees on the under side with Tool Boxes self-acting in the horizontal, vertical and angular cuts.

The Automatic Feed Motion is by rack and pinion and is moved by a specially constructed friction disc.

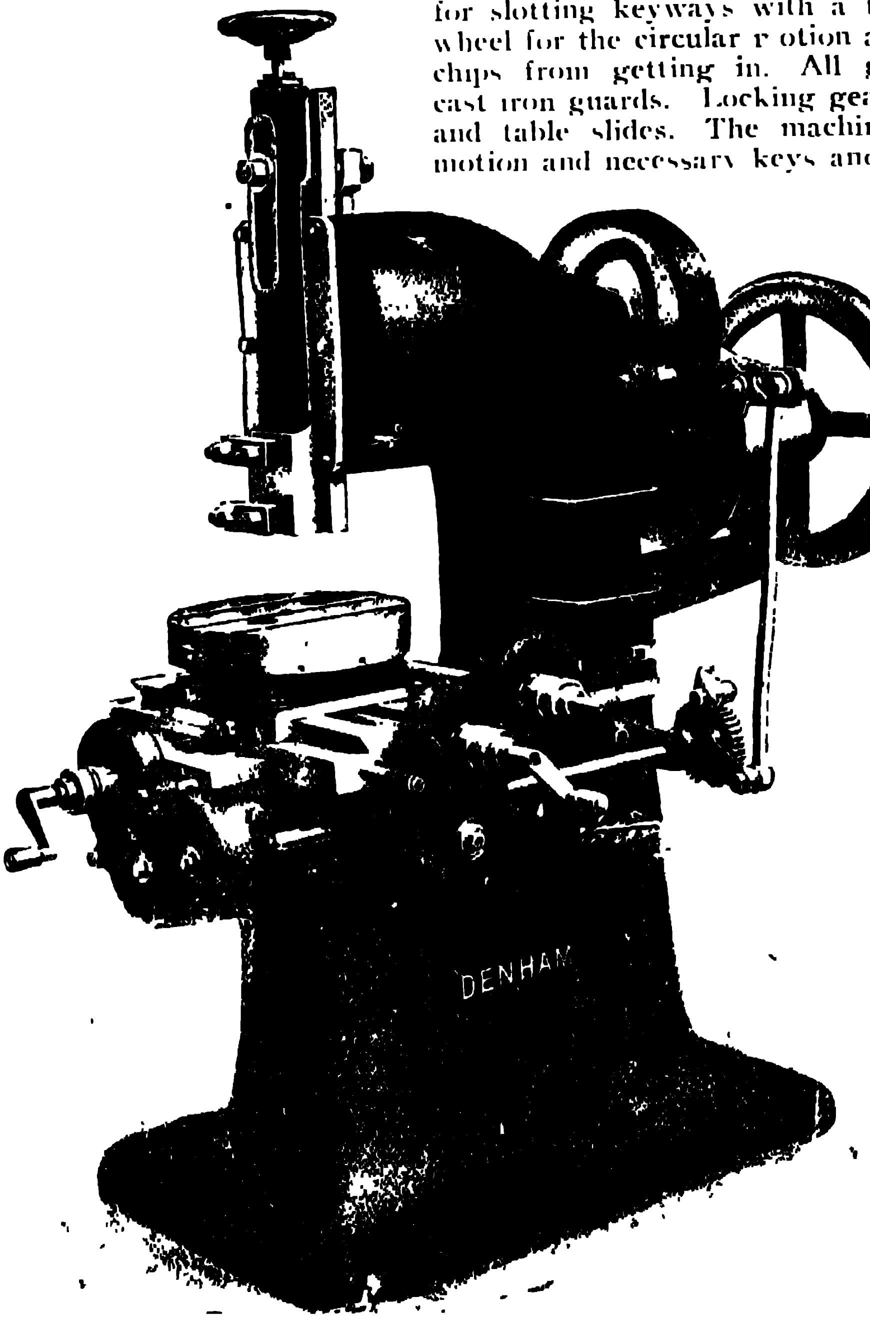
The Driving Pulleys are of large diameter and have a high speed, ensuring ample power.

Dimensions.

Nos	Dimensions.			Size of Table.		Approx. Weights.		Prices.	
	Length.	Width.	Height.	Width.	Centre of V.'s.	With one Tool Box.	With two Tool Boxes.	With one Tool Box.	With two Tool Boxes
	ft. ins.	ft. ins.	ft. ins.	ft. ins.	ft. ins.	cwts.	cwts.	Rs.	Rs.
4	12 0	4 0	4 0	3 6	2 6	280	290	16,520	17,220
4½	12 0	4 6	4 0	3 10	2 6	300	310	17,970	18,650
5	12 0	5 0	4 6	4 3	2 9	330	340	19,600	20,300
5½	12 0	5 0	5 0	4 5	3 0	380	390	22,000	22,800
6	12 0	5 6	5 0	4 10	3 0	400	410	24,300	25,200

6½-in. Slotting Machine with Canting Table.

This machine is of modern design, constructed to meet the requirements of high class slotting. The body is of strong box section fitted with shelves to carry gauges and small tools. The ram has extra long bearing, is adjusted in height by screw, counterbalanced on the spur wheel and is fitted with a 12-inch index and pointer. The disc and crankshaft is a solid steel forging and is graduated to indicate position of stroke. The circular table has hand and automatic feeds in circular, transverse and longitudinal motions, each independent or directly connected with one another and the table has a patent improved canting motion giving 1/16 in., ⅛ in., 3/16 in. and ¼ in. taper per foot for slotting keyways with a taper. The worm and worm wheel for the circular motion are totally enclosed preventing chips from getting in. All gears are fully protected by cast iron guards. Locking gears are fitted to the ram, table and table slides. The machine is complete with overhead motion and necessary keys and spanners.



Max. length of stroke	7 ins
Length of ram	24 in
Vertical adjustment of ram	6½ in
Dia. of work admitted	30 ins
Depth of work admitted	7¼ ins
Longitudinal travel of slide	13½ ins
Transverse travel of slide	9¼ ins
Diameter of table	12½ ins
Number of speeds	3
Countershaft pulley	12 ins by 3 ins
Countershaft speed R.P.M.	130
Weight	12 cwts

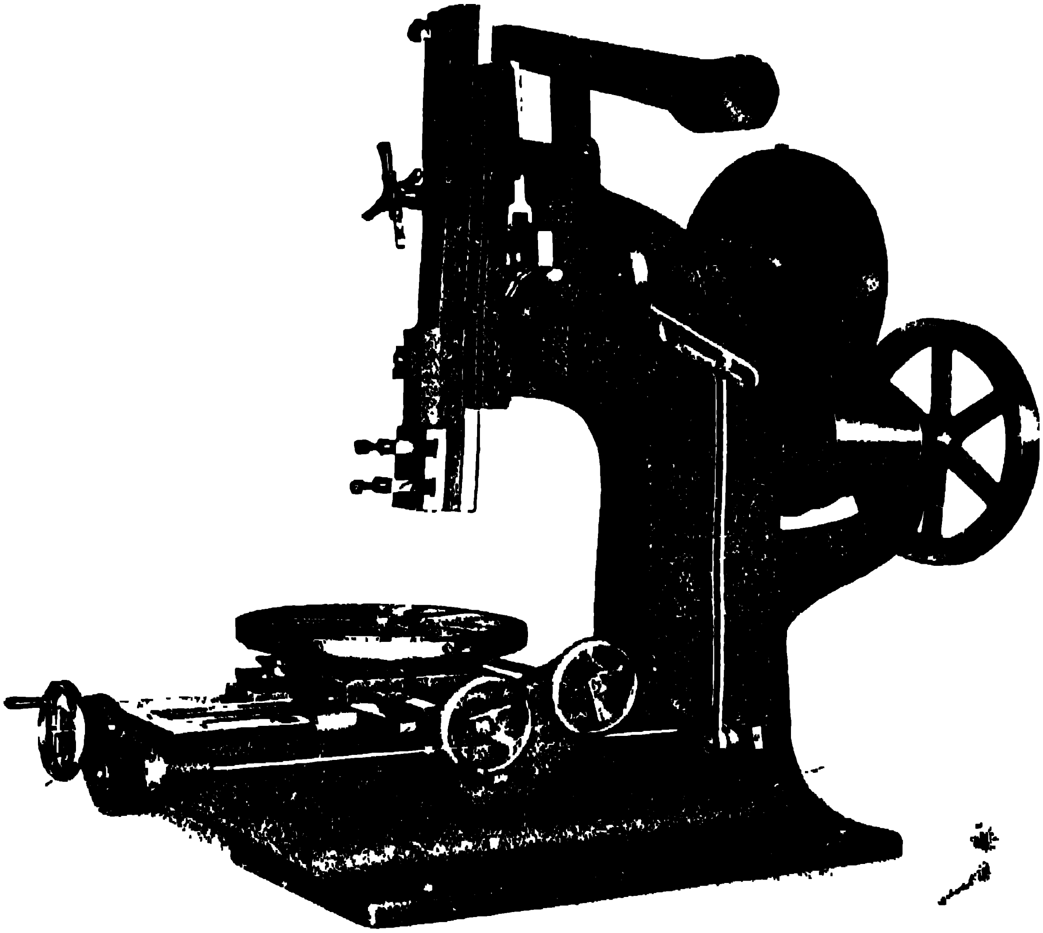
Price .. Rs. 1,550

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Heavy Slotting Machines, 6½ to 20-Stroke.



High-Speed Slotting Machines.

Of powerful and accurate construction and incorporate all recent improvements.

Body is a massive one-piece casting, strongly ribbed and of Box Section constructed to resist strains under the heaviest cuts.

Ram is balanced and adjustable by handwheel and screw in front. Quick return motion is provided, obtained by means of cast-steel link. It slides in continuous adjustable bearings, accurately scraped and bedded. Variation in length of stroke can rapidly be obtained

Tool Holders are of steel, and slide in T slots, and an adjustable stop is provided to take end thrust of Tool.

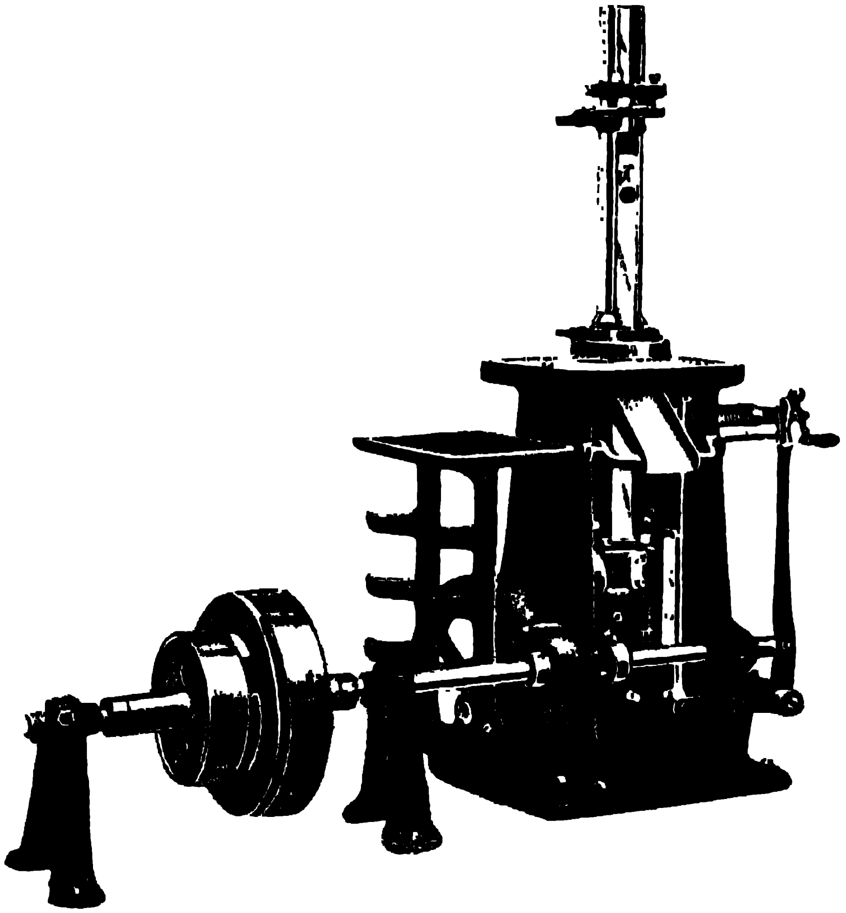
Compound Circular Table is made with suitable T slots for fixing work, and has trough all round for collecting lubricant.

Feed Motions are provided to the table, being automatic in the circular, longitudinal and transverse directions, and are actuated by cam, link, connecting rod, and ratchet wheel. These motions can be reversed, stopped and started when the machine is in operation, and are independent and variable.

Accessories and Equipment. Complete countershaft and necessary spanners and handles

Length of stroke	6½"	9"	12"	16"	18"/20"
Admits in diameter	2' 3"	3' 6"	4' 0"	5' 0"	6' 6"
" " height	8½"	13"	20"	24"	30"
Diameter of table over trough ..	1' 9½"	2' 0"	2' 5"	3' 6"	4' 0"
Longitudinal traverse of table to and from body	9"	1' 6"	1' 11"	2' 3"	3' 6"
Transverse travel . ..	1' 0"	1' 1"	1' 6"	2' 2	3' 0"
Approximate nett weight .. Cwts.	25	35	60	120	200
" gross " .. "	27	39	65	136	220
H.P. required	1½	5	7½	10	15
Price .. .. .. Rs.	**3,475**	**4,840**	**7,200**	**11,925**	**19,700**

Internal ·Keyseating Machines.



This machine is capable of cutting keyways up to 2½ ins. wide by 19 ins. long, and to Keyseat Holes from 1¼ ins. to 10 ins. in diameter.

The machine provides means whereby perfectly true and straight Keyseats in Hub Bores may be obtained irrespective of whether the Bore is parallel or tapered, or whether the Hub in which the Keyseat is to be cut is faced true or left rough.

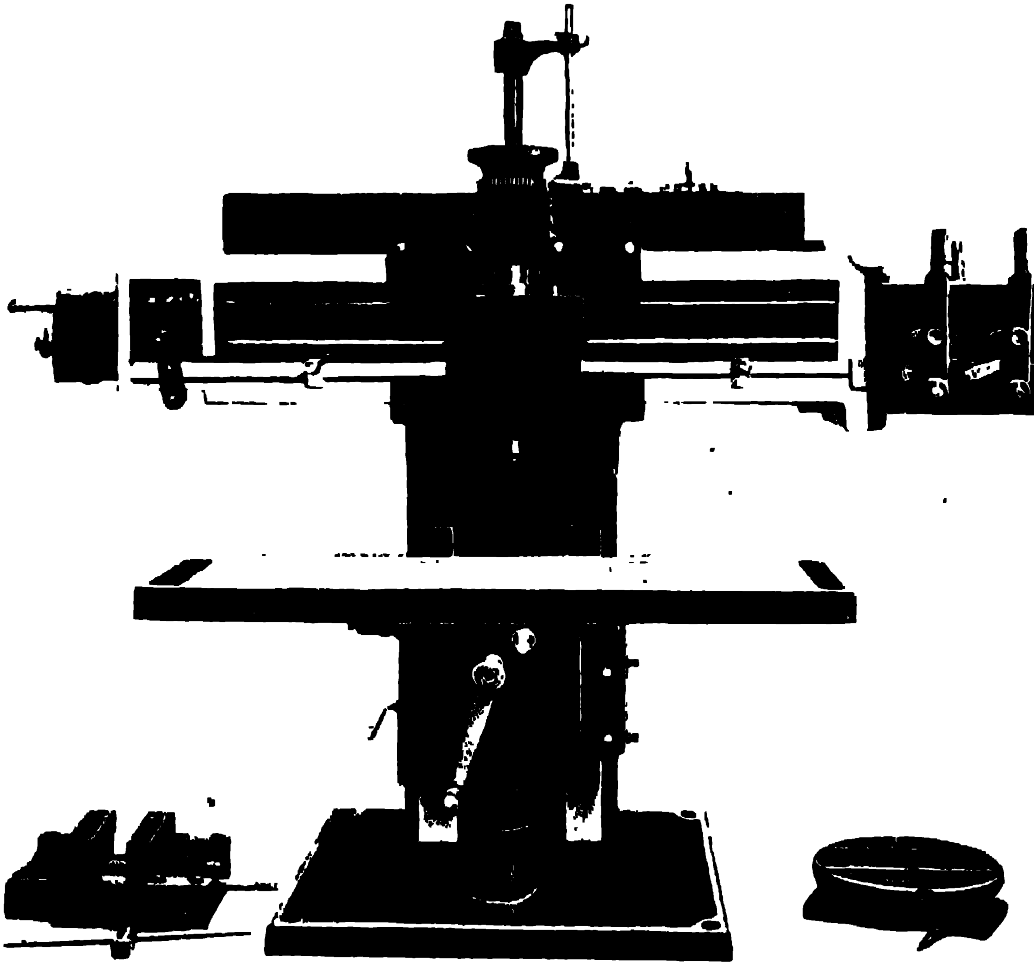
The equipment supplied with each machine includes, three Guide Posts 1 in., 1⅞ ins., and 3 11/16 ins., diam., complete with Cutter Bars, ¼ in., 5/16 in., ⅜ in., 7/16 in., ½ in., ⅝ in., ¾ in., ⅞ in., 1 in, 1¼ ins., 1½ ins., 1¾ ins., 2 ins., and 2½ ins. wide.

Dimensions.

Length of Adjustable Stroke	19"
Width of Keyseats Cut	¼" to 2½"
Diameter of Tool Posts supplied	1", 1⅞" and 3 11/16"
Diameters of Holes Keyseated with Standard Equipment	1" to 10"
Cutting Speed of Tool	15' per min
Return Speed of Tool	30' per min.
Dimensions of Countershaft Driving Pulley . .	10"×3"
Speed of Countershaft	300 R.P.M.
Distance from Centre of Machine to Driving Belt . ..	37"
Horse Power required	4
Floor Space occupied	6'×2'
Approximate Nett Weight	16 cwts.
Price, with Standard Equipments	**Rs. 3,300**

Complete Specification on application.

Automatic Keyway Cutting and Slot Drilling Machines.



These machines are of the highest standard of accuracy.

Two methods of cutting have been adopted, *i.e.*, the Reciprocating motion and the cutting the Keyway At Once Up. When using the former the down feed can be set to operate in any part of the stroke, which is a great advantage.

A Drilling attachment can be fitted, at extra cost, having three changes of feed by gears.

The accessories include Countershaft, Sample Cutter, Tank for Lubricant and Spanners.

Dimensions.

No. of Machine							7	8
Maximum keyway cut	1¼"	1¼"	1½"	1½"	2"	2"	3"	3"
„ length cut ..	18"	24"	24"	30"	24"	30"	30"	30"
Vertical feed of Spindle	6"	6"	8"	8"	8"	8"	8"	10"
Centre of Spindle to column	8½"	8½"	10"	10"	10"	10"	11"	11"
Working Surface of Table	24" × 10"	30" × 10"	32" × 12"	38" × 12"	32" × 14"	38" × 14"	38" 16"	102" × 16"
Number of Longitudinal Feeds	4	4	6	6	6	6	6	6
Transverse movement of Table	7"	7"	8"	8"	8"	8"	8"	8"
Approx. nett weight ..	15 cwts	16 cwts	26 cwts.	28 cwts.	33 cwts.	36 cwts.	55 cwts	73 cwts.

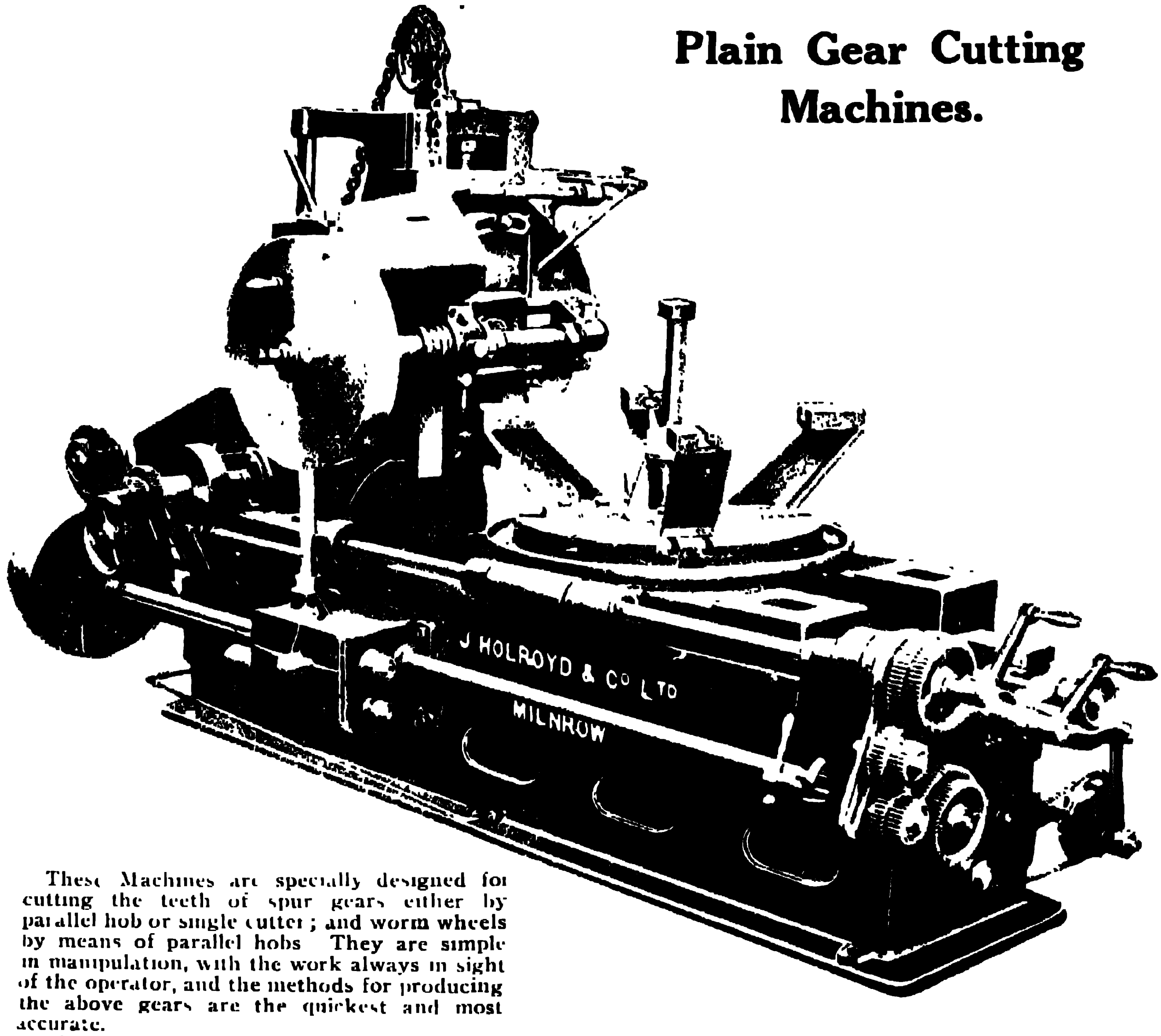
Prices and detail Specification on application

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Plain Gear Cutting Machines.



These Machines are specially designed for cutting the teeth of spur gears either by parallel hob or single cutter; and worm wheels by means of parallel hobs. They are simple in manipulation, with the work always in sight of the operator, and the methods for producing the above gears are the quickest and most accurate.

The bed is of very substantial construction, designed to form a rigid support for the machine when at work. It is accurately machined and prepared to receive the parts mounted upon it and the inside is arranged to form a tank for the lubricant.

The cutter head is fitted to the vertical face of the upright, and is balanced by weights inside the upright.

It has self-acting vertical traverse and also hand adjustment, and is arranged with a slight indexed swivel motion on each side of the centre.

The cutter spindle is of steel running in parallel gun-metal bearings with adjustment for wear, and with provision for taking the end thrust. The spindle nose is bored Morse taper to receive the cutter machined and is cross slotted for driving purposes.

The table has ample working surface provided with tee slots for clamping the work supports, and a trough is cast round to catch the lubricant. The work is supported by brackets round its outer edge to give rigidity whilst the wheel is being cut.

The saddle can be traversed along the bed by hand or power, correctly set by micrometer discs, and locked in position. The table is held central by a taper spindle which revolves in a suitable bearing having adjustment for wear. It is revolved by worm gearing driven by change wheels from the gear box. The saddle also forms an oil bath which allows the worm and bearing surfaces to be in continual contact with oil, thus ensuring smooth running.

These machines can be arranged with an attachment for Internal Gear Cutting, which adds considerably to the usefulness of the machine, and is well worth the extra cost.

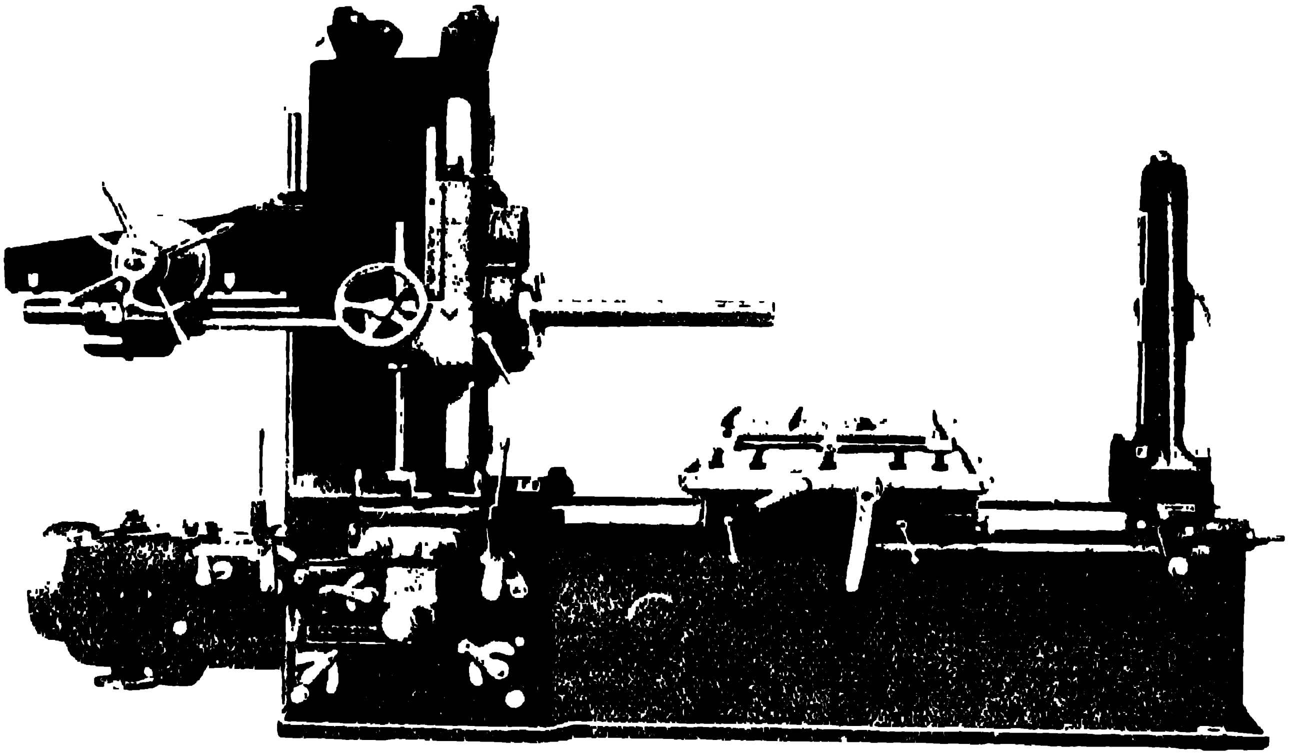
Prices and detail Specification on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON.

Horizontal Boring, Drilling, Tapping and Milling Machines.



The illustration shows the type of the 2¼ ins. and 3½ ins. **"Central Thrust" Type Horizontal Boring, Drilling, Tapping and Milling Machines,** the 3 ins. being somewhat similar, arranged with single pulley belt drive through 18 speed gear box, fitted with friction reversing clutch for tapping. These machines possess many distinct advantages, and the Thrust on the Spindle being taken directly upon the ample surfaces of the very rigid main upright, goes to make the machine capable of performing very powerful, accurate and rapid machining operations

Dimensions.

Diameter of Spindle		3"	3½"
Traverse „ „ at one setting	18"	24"	24"
Total Traverse of Spindle at two settings .	36"		48"
Vertical Traverse of Spindle .	18"	20"	21"
Spindle Bored Morse Taper . . .	No 4	No 5	No 5
Maximum distance Spindle to top of Revolving Top Table	18¾"	20"	21⅛"
„ „ „ „ „ „ main Table ..	22⅛"	24"	25¾"
„ „ from Face-plate to outer support	4' 6"	5' 6"	6'–0"
Size of main Table, width and length	22"×36"	28"×45"	28"×45"
„ „ Revolving Top Table ..	22"×22"	28"×28"	28"×28"
Cross Traverse of Table	24"	30"	30"
Longitudinal Traverse of Table (hand only on 3 ins machine)	25"	33"	33"
Number of Spindle Speeds . . .	18	12	18
Range of Spindle Speeds, R.P.M.	8 to 250	10 to 300	7 to 200
Number of Feeds in all movements . .	9		9
„ „ „ to Spindle and Table	9	8	9
Range of Feeds in all movements per rev. of Spindle	·006" to ·115"	·007" to ·125"	·007" to ·134"
Dimensions of Driving Pulleys	14"×3"	15"×3½"	15"×3½"
Speed of Driving Pulleys, R.P M .	360	250	310
H. P. required	5	7	9
Approximate nett weight	62 cwts.	82 cwts	104 cwts
Price, with accessories and equipment ..	**Rs. 11,065**	**Rs. 11,765**	**Rs. 18,235**
Extra for Facing Head	**470**	**480**	.. **600**

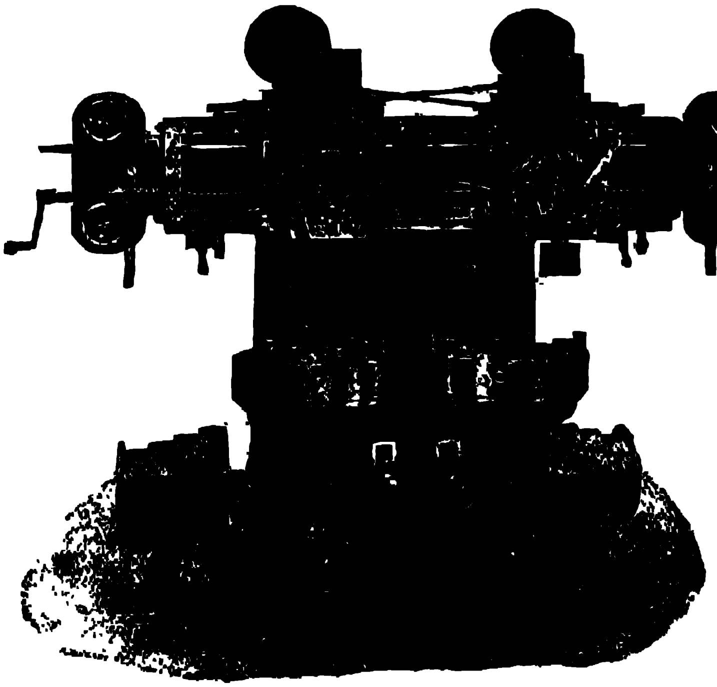
Complete Specification on application.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

20-in. Duplex Vertical Boring and Turning Mills with Turret Heads.



These are manufacturing machines adopted for the rapid handling of medium sized work. They are of high-class design, accurately fitted and suitable for obtaining best results from High-speed Steel Tools.

The Spindles are of large diameter, running in conical adjustable bearings. The downward thrust is taken on a large pressure ring running in oil bath directly under the chuck.

The Tables are each driven by a 4-step cone of large diameter and single or double gearing, which can be thrown in or out of action while the machine is in motion, by means of levers in front of the machine independent of the countershaft

The Chucks are of ample strength and have four forged steel, case hardened, independent and reversible jaws, which are accurately fitted.

The Feed Motions can be instantly changed from one to the other whilst the machine is either in motion or stopped. An interlocking device is fitted so that no two motions can be in operation at the same time.

The Drive is by means of 4-step cone, double gearing, and counter motion, giving a range of eight speeds, and if desired two gear boxes can be fitted in place of cone drive.

The Gearing is all machine cut from the solid and neatly guarded.

Accessories and Equipment. Countershaft, two sample Tool Holders all necessary handles and spanners are supplied.

Dimensions and Prices.

Diameter of Chucks	20 ins
Will swing in gap	22
Admits in height under cross slide	16
" " " " Turret	19
Number of holes in Turret	5
Diameter " " " "	1¼
" " " " " ..	12 "
" " driving cones 18, 16, 14, and	12 "
Width " " " " ..	3½ "
Diameter of counter motion pulleys ..	20
Width " " " " ..	5

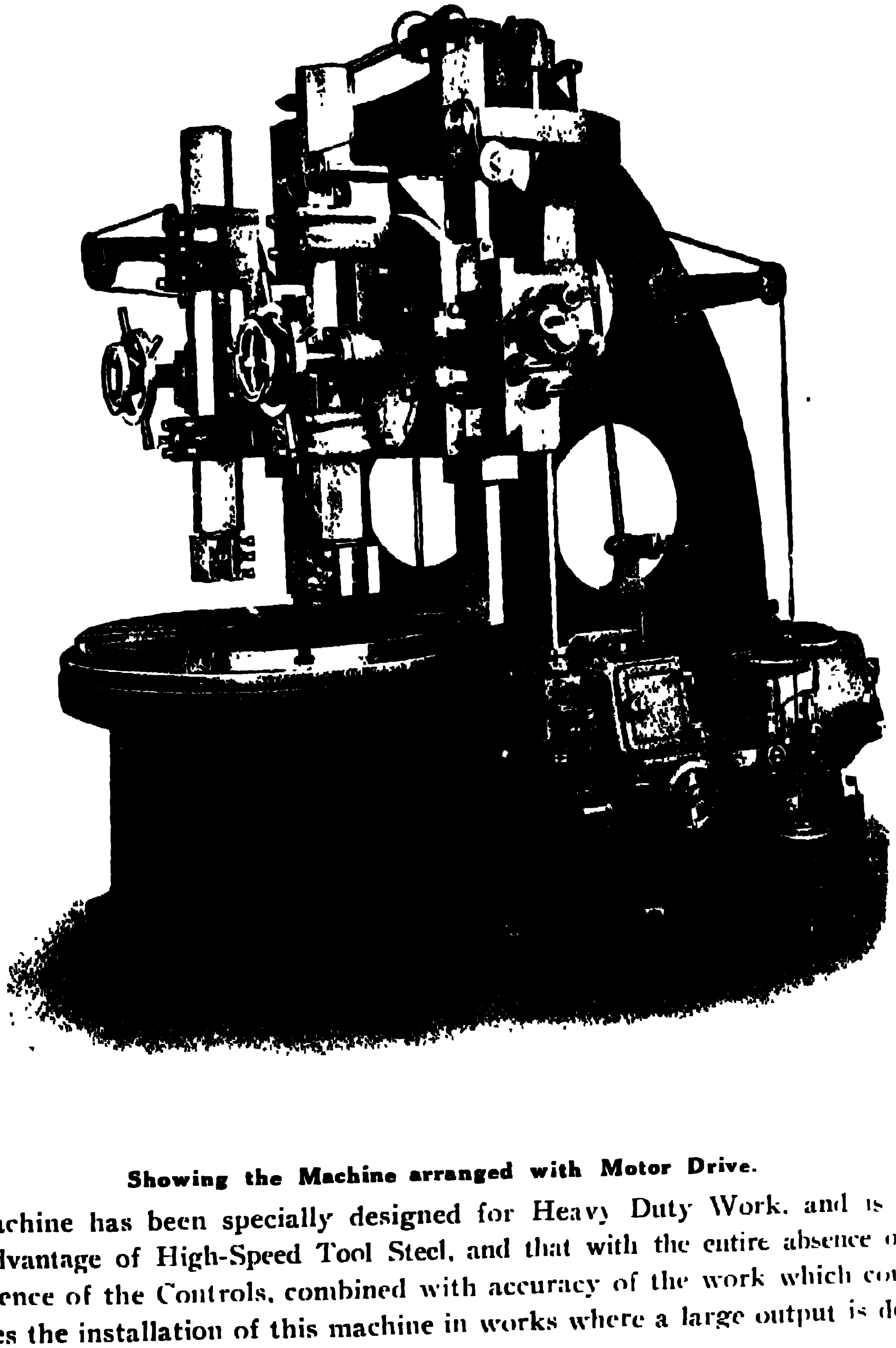
Speed of counter motion pulleys ..	262
Number of Chuck speeds ..	8
" " feeds	6
Approximate nett weight	3½ tons
" gross "	4 "
" Space occupied	8 ft. by 4 ft. 6 ins.
Horse-power required for each head	5
Cone drive with plain heads **Price, Rs.**	**10.130**
" " " **swivel heads " "**	**11.880**
Extra for Gear Box Drive " "	**1,870**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Vertical Boring and Turning Mill.



Showing the Machine arranged with Motor Drive.

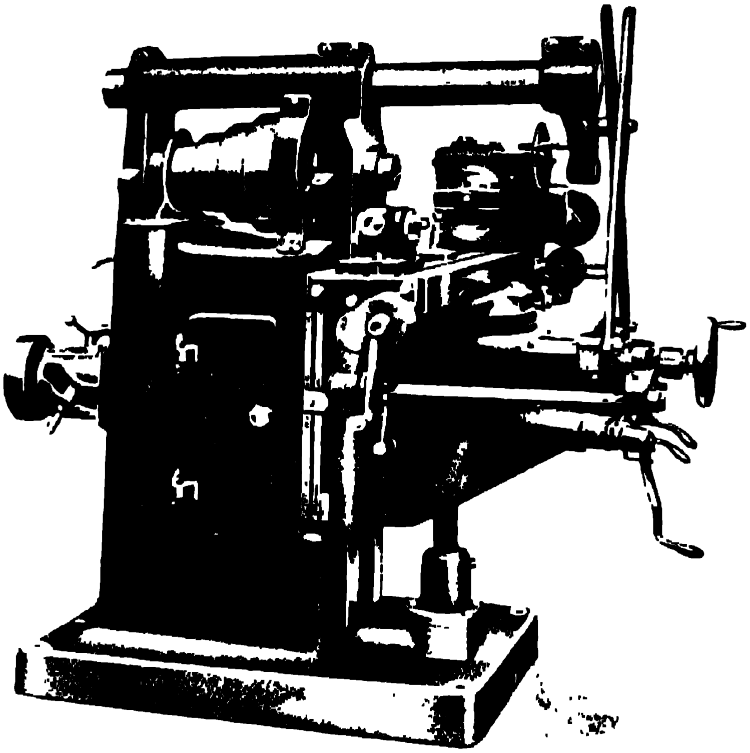
This Machine has been specially designed for Heavy Duty Work, and is capable of taking full advantage of High-Speed Tool Steel, and that with the entire absence of vibration. The convenience of the Controls, combined with accuracy of the work which comes off the table, justifies the installation of this machine in works where a large output is desired.

These machines are made in sizes ranging from 3 ft. diameter to 8 ft. diameter

Detailed specification and prices on application.

Universal Milling Machines.

Nos. 2 and 3.



The Drive is by Cone Pulley and Double Gearing. The No. 2 machine has Single Helical Gearing and 4-step cone. The No. 3 has two Ratios of Back Gearing and 3-step cone.

The Spindle is of chrome-nickel steel. The front journal is conical, and runs in a gun-metal bearing

The Overhanging Arm is a solid Steel Bar. Rigid Arbor support and adjustable arm braces are fitted

Power Feed Motion. The machines have Automatic Longitudinal, Transverse and Vertical Feeds. Interlocking device is fitted to prevent simultaneous engagement of Vertical and Transverse Feeds, also adjustable stops are fitted to trip the feed at any desired point, and fixed stops to prevent over-running.

The Table may be swivelled 50° either way without removing cover plate Graduated dials are fitted to obtain precise adjustment in each direction.

The Feed Box is at the back end of machine, and is independently belt-driven from countershaft. No. 2 machine has 12 rates of Feed, and No. 3 has 16

Dividing Heads of massive design, accurately constructed, with large driving wheel.

Accessories and Equipment supplied consist of a set of Universal Dividing Heads, complete with Division Plates, reversible Base Block, Tailstock, Driving Plate, Work Support, 3-jaw Chuck and Adaptor, set of Change Wheels and Quadrant, Arbor and Spacing Collars, Intermediate support for Arbor, Brace for overhanging arm, two speed countershaft, and all necessary Handles, Spanners and Machine Vice.

Dimensions.

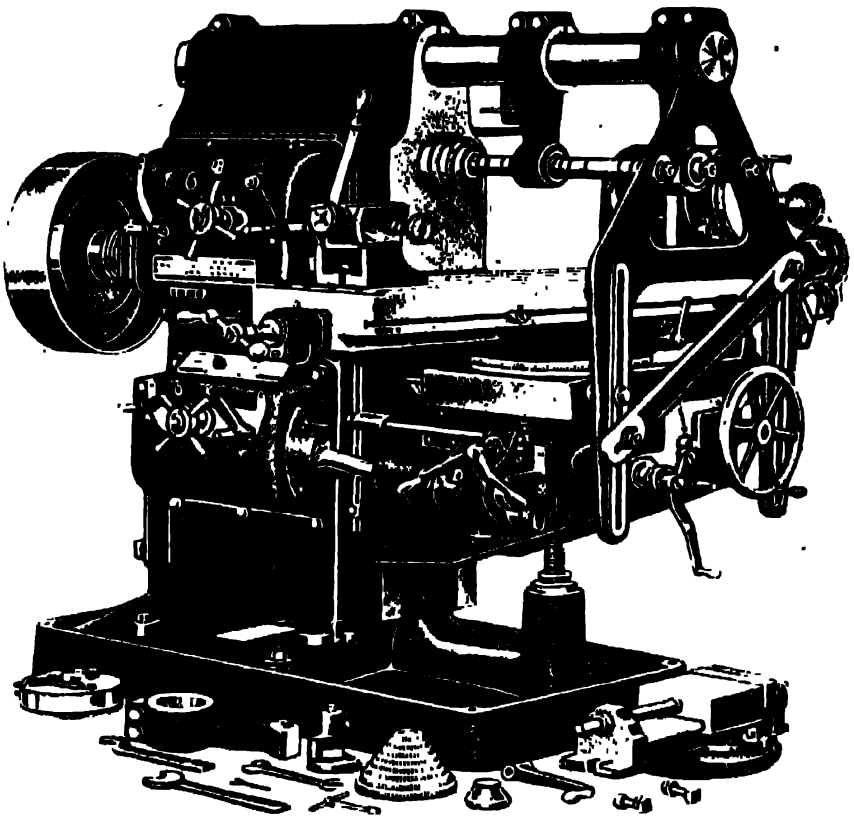
	No 2	No. 3
Automatic Longitudinal Feed	25"	36"
" Transverse Feed	8½"	10"
" Vertical Feed	18½"	20"
Length and width of Table	46"×10"	53⅝"×12"
Centre of spindle to underside of overhanging arm ..	6⅛"	7⅛"
Number of steps on Cone Pulley	4	3
Diam. and width of largest step	12"×2⅞"	13"×3½"
Number of spindle speeds	16	18

	No. 2	No 3
Back Gear Ratio	6·42 to 1·33 & 11·2 to 1	
Number of Feeds .	12	16
Range of Feeds (per min.)	·58" to 12"	½" to 14¾"
Speeds of Countershaft R.P.M. .	165 to 205	176 to 326
Dividing Head, Swings ..	10"	12"
" " Admits between centres ..	22"	36"
Approx. nett weight	34 cwts.	40 cwts.
Price, with accessories ..	**Rs. 6,330**	....

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Universal Milling Machines.

Nos. 4 and 5.

These machines are intended for light and heavy manufacturing and tool room work They are built to the finest limits of accuracy, have every facility for easy manipulation, and combine great power and strength

The Column is a massive casting with large front slide for the knee

The Knee is of box section, designed to ensure great rigidity, and affords large bearing surfaces It has long taper adjustment strips for compensating wear.

The Spindle is hardened, ground, and runs in adjustable bearings A large front flange is fitted, and clutch drive for face cutters, etc

Drive by constant speed single pulley, affording great power, giving 16 spindle speeds, no countershaft is necessary All gears are of hardened steel All changes rapidly effected by lever movement

Overhanging Arm of steel. Rigid arbor support and arm brace fitted

Table of special chilled iron, 3 T slots and oil channels rapid hand motion fitted It swivels 52" either right or left

Power Feed Motions in all directions, longitudinal, transverse and vertical all reversible All changes made by lever movement while machine is running Adjustable stops are provided to all feed motions

The Universal Dividing Heads are built to the finest limits of accuracy The tailstock has inclinable spindle graduated

Accessories and Equipment include Dividing Heads complete with all attachments, one Arbor 3 Arbor Supports, Adjustable Arbor Bearing and 2 Bushings, Draw in Bolt, Arbor Extractor Swivel Vice, Steady Rest, 3-Jaw Chuck, and all Handles and Spanners

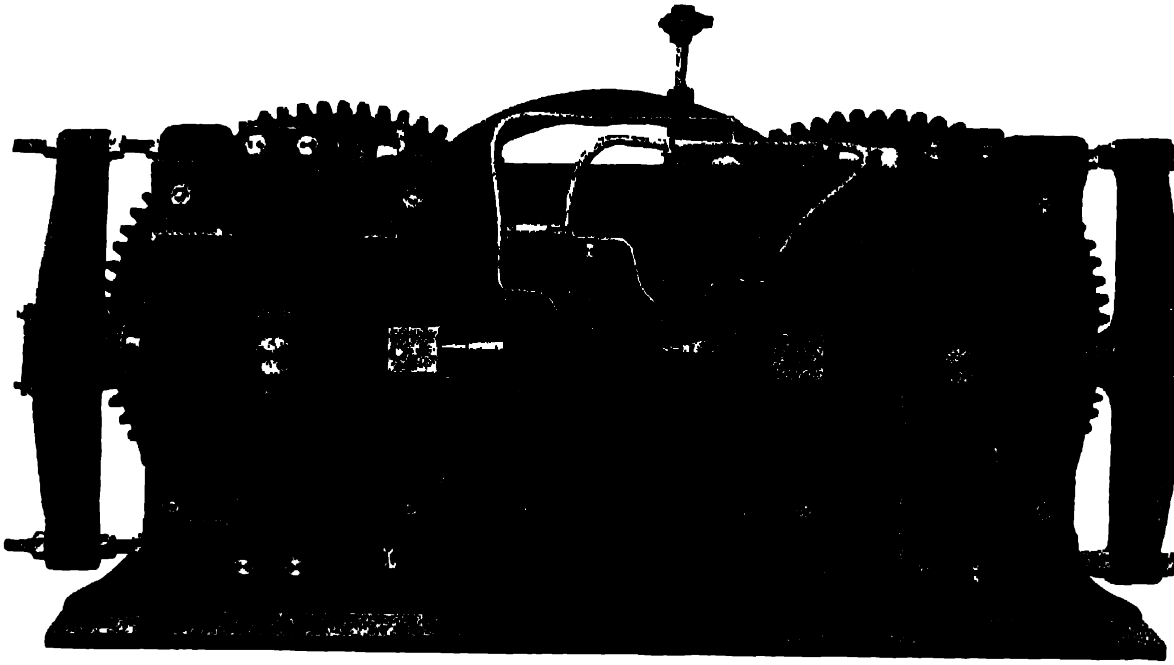
Dimensions.

	No. 4	No.
Automatic Longitudinal Feed ..	34"	42"
" Transverse Feed ..	10"	12"
" Vertical Feed .	17"	12"
Working Surface of Table .	52¾"×12"	65"×14"
Face of Column to Arm Braces ..	28½"	30"
Dividing Head, Swing	12"	14"
Dividing Heads, admit between Centres	30"	42"

Number of Spindle Speeds .	16	16
Range of Spindle Speeds, R P M	15 to 375	14 to 350
Number of Feeds	16	16
Range of Feeds per minute .	[illegible]	[illegible] to 20"
Dimensions of Driving Pulley .	18"	[illegible] 6" [illegible] 11"
From Overhanging Arm to Centre of Arbor	6¾"	6¾"
Approx. Nett Weight .	47 cwts	58 cwts

Detail specification and prices on application.

Nut Forging Machines.



These Machines are for the rapid production of Square, Hexagonal and other Nuts. They will cut from the bar and make at one blow any kind of nut, and will repeat the operation at every stroke of the machine until the whole length of heated bar is used up. The greater part of the burr from hole in nut is forced into the body of nut, so there is little waste.

All machines are self-contained and have fast and loose pulleys, belt striking gear and water pipes for cooling tools.

A patent Nut Remover, together with one set of tools for one size of nut, is supplied with each machine.

Dimensions.

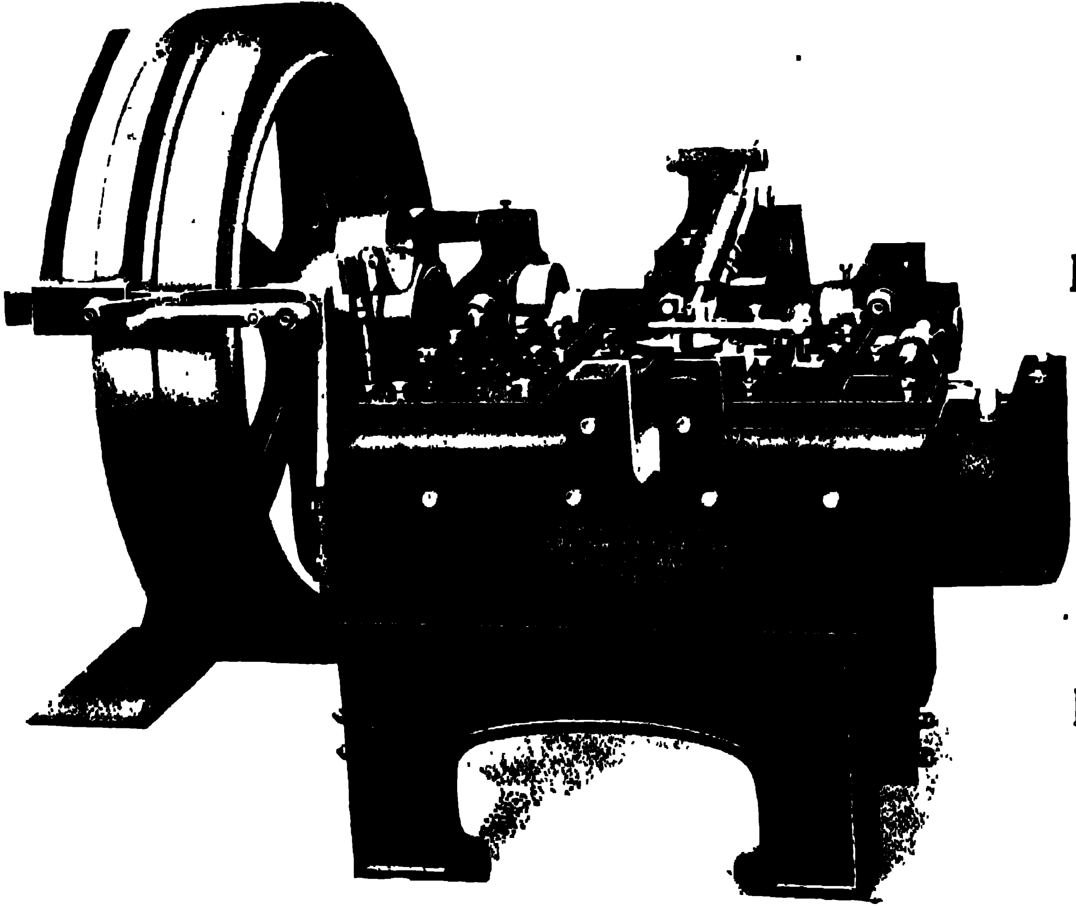
Size of Machine ..	½ in.	¾ in.	1 in.	1½ ins.	2 ins.	3 ins.
Height	2 ft. 6 ins.	3 ft. 4 ins.	3 ft. 5 ins.	4 ft. 3 ins.	5 ft. 2 ins.	6ft.1½ins.
Width ..	4 „ 9 „	5 „ 8½ „	6 „ 9½ „	8 „ 6 „	10 „ 10½ „	15 „ 8 „
Front to Back .	3 „ 6½ „	3 „ 7 „	3 „ 10 „	4 „ 2 „	5 „ 0 „	7 „ 6½ „
H. P.	5	7	10	15	20	35
Diameter of Pulleys . .	12 ins.	14 ins.	16 ins.	20 ins.	24 ins.	48 ins.
Width of Pulleys . ..	3 „	4 „	4 „	5 „	6 „	7¼ „
Speed of Pulleys, R P M .	375	290	300	270	220	220
Strokes per minute	75	70	60	50	44	40
Approx. Nett Weight . ..	20 cwts.	40 cwts.	54 cwts.	87 cwts.	163 cwts.	500 cwts.

Detail specifications and prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



The Horsfall's Patent Bolt and Nut Making Machine.

The illustration shows the well-known Horsfall's Patent Bolt and Nut Making Machine as supplied by us to the E. B. Railway. We use several of these machines in our own Works.

Range of Sizes.—The machine is made in seven sizes, the largest of which will produce bolts, nuts, rivets, etc., up to 2¼ ins. diameter.

Rate of Production.—The output obtainable necessarily varies with the experience of the operator, the class of work and the heating capacity of the furnace. The labour cost is the same irrespective of the size of article produced upon the same machine Thus, while the No. 1 machine will make 60—80 gross of ⅝ ins. bolts per week, the No. 2 machine, running at a slower speed, will only make 45—50 gross of this size bolt in the same time The machines can be operated by unskilled labour, and, except in the case of countersunk and rivet heads, no finishing by hand is necessary. The work produced on the "Horsfall" Machine is at least equal to the very best hand-forged.

Bolts, Screws, Spikes and Rivets are made from the round bar (which should be carefully sized), and may have any desired form of head, namely :-

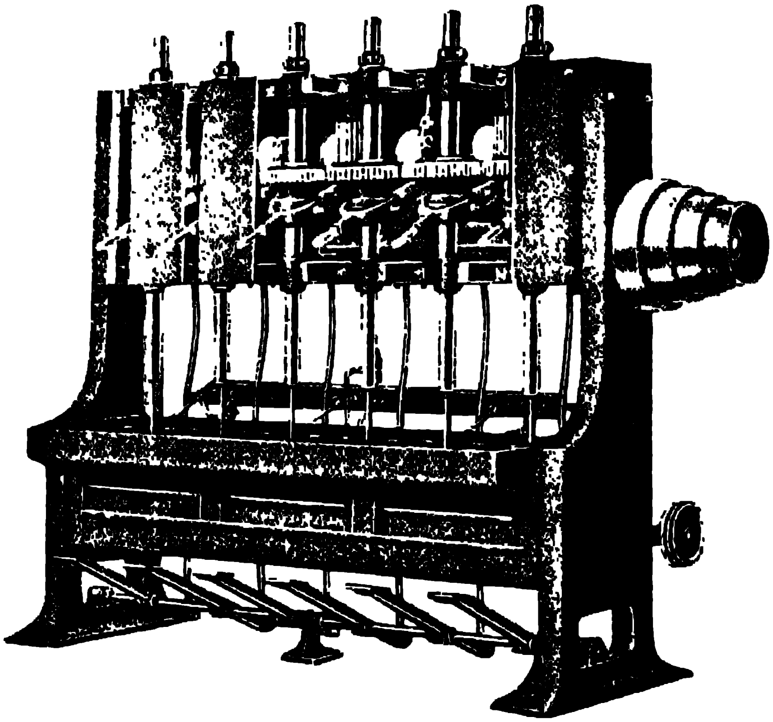
Square heads with either square or round necks.
Hexagon heads with round necks
Mushroom heads with square, oblong or round necks.
Countersunk heads with square, oblong or round necks.
Cheese heads with square or round necks

Leading Dimensions.

MACHINE.	No. 1B.	No. 2B.	No. 3.	No. 4.
Capacity, bolts, etc., up to diameter	¾"	1¼"	1½"	2¼"
Driving pulleys, size	48"×5"	60"×6½'	36"×8½"	42"×9"
Revolutions per minute (pulleys) ..	70	70	180-190	185
Horse power required	8	15	25	40
Approx. nett weight	70 cwts.	150 cwts	220 cwts.	510 cwts

Smaller sizes can also be offered.
Prices and detail specification on application.

Vertical Nut Tapping Machines.



These machines are designed for the rapid Tapping of Square and Hexagonal nuts, within the capacity stated.

The drive is by cone Pulley. The 1 in., 1½ ins. and 2 ins. machines are Back Geared. These sizes are also fitted with adjustable Nut Holders and Quick-acting Sockets and Taps can be removed and replaced while the machine is running at full speeds.

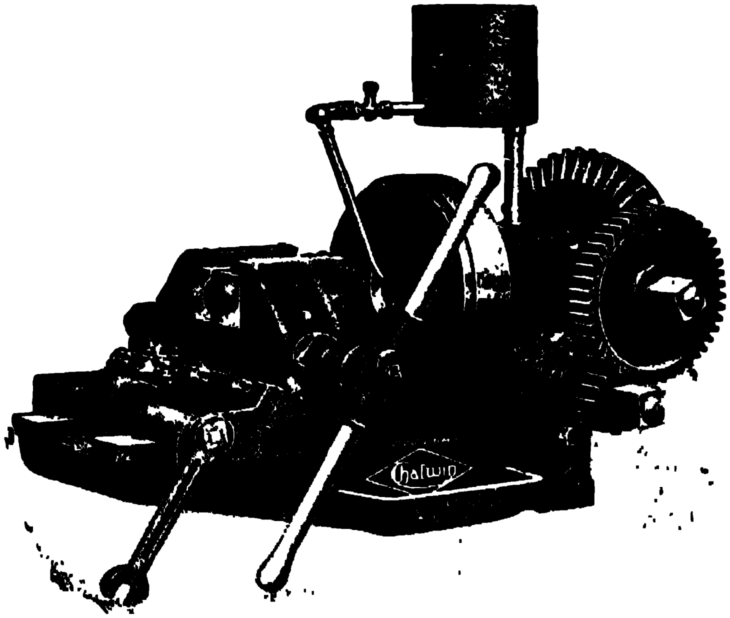
The spindles on the 1 in., 1½ ins. and 2 ins. machines are counter balanced to prevent breakage of Taps, which are sometimes broken by heavy spindles.

The machines are supplied complete with Pump, Countershaft, Spanners and Chip Pans also complete range of Quick-acting Spring Sockets and Taper Tap as specified below.

Specification.	Dia. and width Largest Cone Pulleys.	Speed of Counter-shaft. R. P. M.	Ratio of Geared Spindles			Approx. Nett Weight. Lbs.
			1st Pair.	2nd Pair.	3rd Pair.	
Four Spindle Machine, ¼" to ½", with 4 Taps for ¼", 5/16", ⅜" and ½"	10"×2"	250				1160
Six Spindle Machine, ¼" to ½", with 2 Taps each for ¼", ⅜" and ½"	12"×2"	280				1750
Four Spindle Machine, ⅜" to 1", with 6 Quick-Acting Sockets and 6 Taps, ⅜", ½", ⅝", ¾", ⅞", and 1"	14"×4"		4¾ to 1	3¼ to 1		2850
Six Spindle Machine, ⅜" to 1", with 6 Quick-Acting Sockets and 6 Taps, ⅜", ½", ⅝", ¾", ⅞" and 1"	14"×4"	280	4¾ to 1	3¼ to 1	2¼ to 1	3850
Four Spindle Machine, ½" to 1½", with 9 Quick-Acting Sockets and 9 Taps, ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜" and 1½"	6½"×4"	300	5½ to 1	4¼ to 1		4750
Six Spindle Machine, ½" to 1½", with 9 Quick-Acting Sockets and 9 Taps, ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜" and 1½"	6½"×4"	300	5½ to 1	4¼ to 1	3½ to 1	5950
Four Spindle Machine, ½" to 2", with 11 Quick-Acting Sockets and 11 Taps, ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜", 1½", 1¾" and 2"	16"×4"	300	22½ to 1	17¼ to 1		5050
Six Spindle Machine, ½" to 2", with 11 Quick-Acting Sockets and 11 Taps, ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜", 1½", 1¾" and 2"	15"×4"	300	22½ to 1	17¼ to 1	13¾ to 1	6550

Detail specifications and prices on application.

Chatwin's Bench Screwing Machines with Adjustable Chaser Dies.



The dies screw a full thread at once over and can be released without screwing back.

Capacity, ¼ in. to 2 ins. pipes, ¼ in. to 1½ ins. bolts.

These machines have been standardised by the makers as the result of many years' experience in screwing machine construction and have the following advantages. All parts are interchangeable. Dies are adjustable and will screw iron or steel, and can be released without winding back over thread.

An adjustable stop is provided for setting head for repetition work. The open top self-centring vice will hold bends and short pieces. The Gear ratio permits easy screwing and the machine can be worked by comparatively unskilled labour.

Weight of machine, as illustrated, 2¼ cwts.
„ „ „ with stand, 3¾ „

As illustrated with dies (reference C and D) .. .	Price, Rs. 960
Mounted on Stand for Hand and Power . - ..	„ „ 1,275

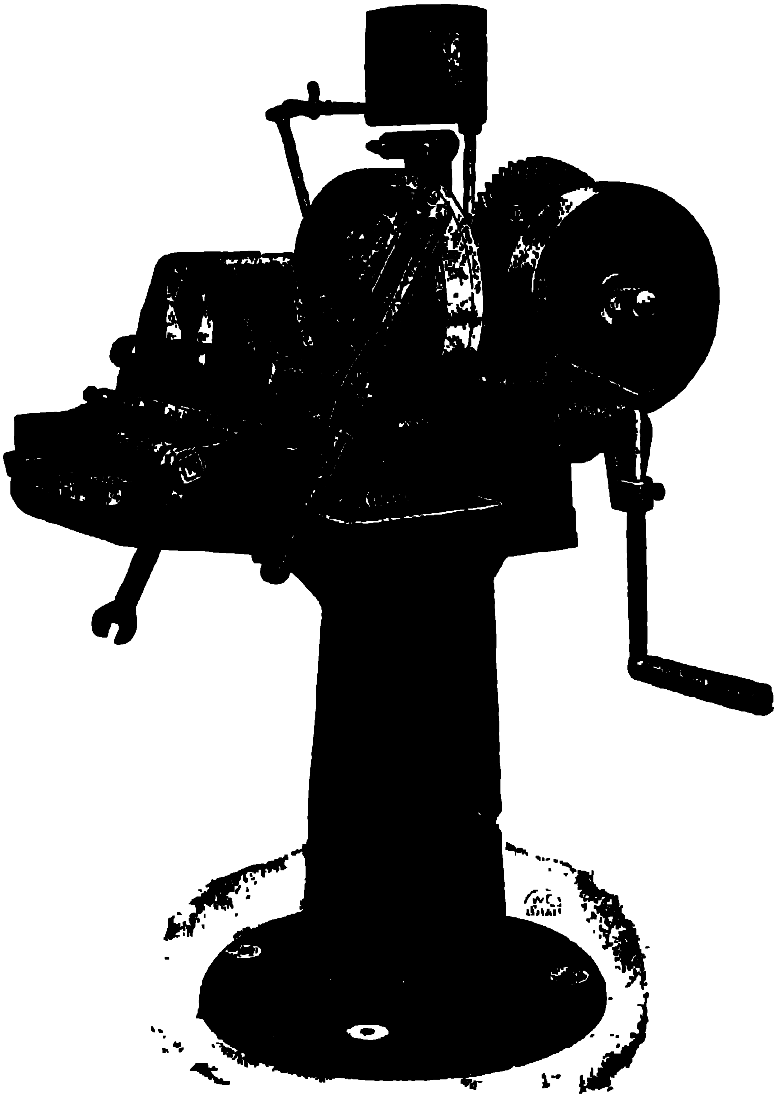
Reference.	Range.	No. of sets of dies.
A (Gas) ..	1", 1¼", 1½", 1¾", 2"	..
B „ ..	½", ¾", 1", 1¼", 1½", 1¾", 2" ..	..
C „ ..	¼", ⅜", ½", ¾", 1", 1¼", 1½", 1¾", 2"	..
D (Whit) ..	¼", ⅜", ½", ⅝", ¾", ⅞", 1", 1⅛", 1¼" 1⅜", 1½"	

We can offer any combination of the above Die sizes which may be required.

A cutting off attachment can be supplied at extra cost.

Chatwin's Pipe and Bolt Screwing Machines.

Hand or Power Drive. Model No. AA-19, Size 4.



The machine is generally as described on the preceding page. It is fitted with an open top self-centring vice which will hold bends or short pieces.

Weight about 7¾ cwts.

Reference.		Range.	No. of sets of dies.
A	(Gas) ..	2", 2¼", 2½", 2¾", 3", 3½", 4"	1
B	" ..	1", 1¼", 1½", 1¾", 2", 2¼", 2½", 2¾", 3", 3½", 4" ..	2
C	" ..	½", ¾", 1", 1¼", 1½", 1¾", 2", 2¼", 2½", 2¾", 3", 3½", 4" ..	3
D	" ..	¼", ⅜", ½", ¾", 1¼", 1½", 1¾", 2", 2¼", 2½", 2¾", 3", 3½", 4"	4
E	(Whit) ..	½", ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜", 1½", 1⅝", 1¾", 1⅞", 2" ..	9

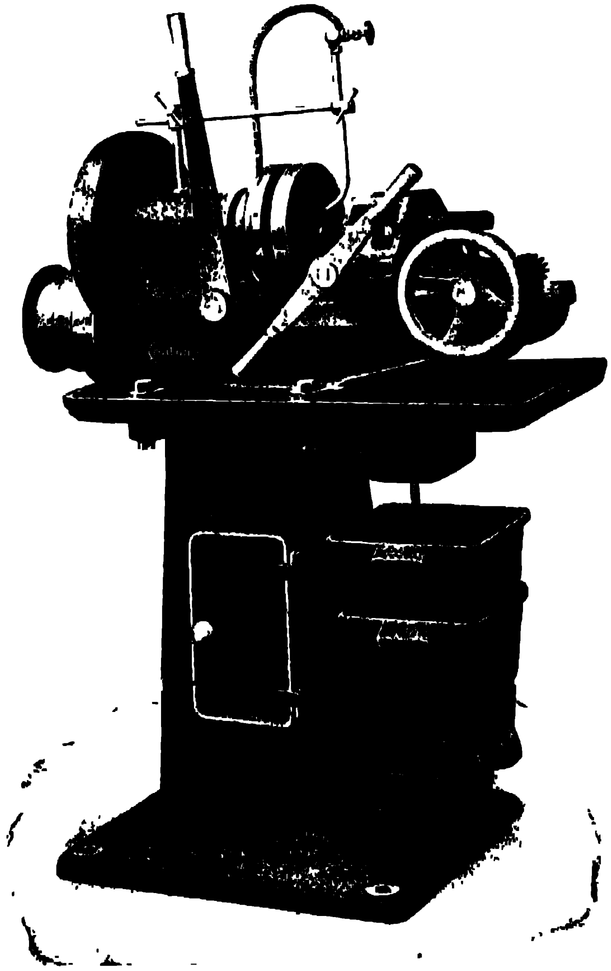
Machines can be supplied with any sets of dies required if sizes are included in the above list.

Cutting off attachment can be supplied if required

Machine with complete set of Dies (reference D and E) .. **Price, Rs. 1,500.**

Chatwin's Q.R. Model Bolt Screwing and Nut Tapping Machine.

With Quick Opening Dies.



Lever opens and closes Dies **instantaneously** without stopping Die Head.

Made in 2 sizes:—No. 0 for Bolts ¼" to ¾". No. 1 for Bolts ¼" to 1".

This Machine has Four-Chaser adjustable Quick Opening Dies, and is designed for rapidly threading quantities of small Studs or Bolts.

The Die Spindle is hollow and of steel.

Gearing is machine cut Spur Type Single Purchase and is protected by cast-iron guard. Power Drive only from overhead countershaft is provided for

Overhead Countershaft giving six changes of speed to Die Head is supplied as standard.

Oil Pump for lubricating Dies is fitted as shown, together with Swarf and Settling Tanks.

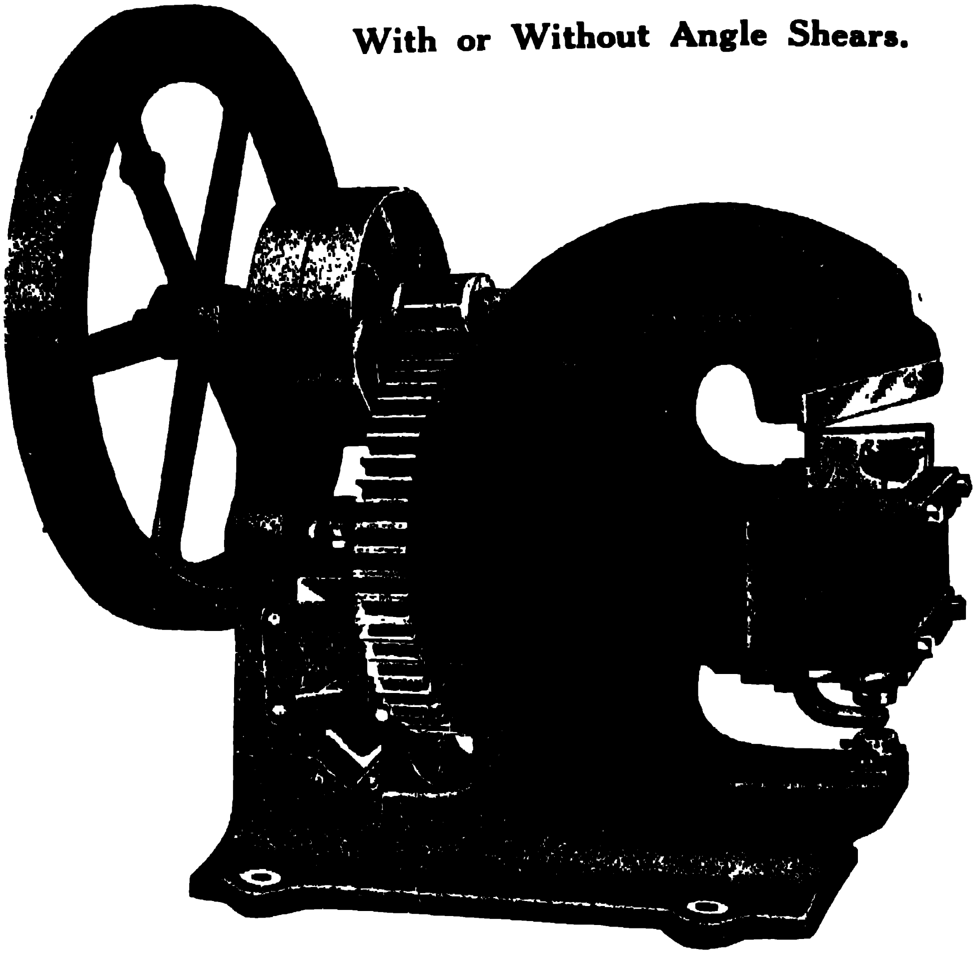
Size.	Dies included.	No. of sets of dies.	Price.
			Rs.
0 QR.	¼", 5/16", 3/8", 7/16", ½", 5/8", ¾"	.. 7	1,050
1 QR.	¼", 5/16", 3/8", 7/16", ½", 5/8", ¾", 7/8", 1"	.. 9	1,400

Pipe Dies can be supplied .. .. ⅛" to ½" to fit No. 0 QR Machine
" " .. ¼" to ¾" to fit No. 1 QR Machine.

Electric **Conduit Thread Dies** can be supplied .. ½" to ¾" to fit No 0 QR. Machine.
" " .. ½" to 1¼" to fit No 1 QR Machine

Single-Ended Punching and Shearing Machines.

With or Without Angle Shears.



All sizes are designed and manufactured on modern lines, and are of solid proportions, the wearing surfaces ensuring long life and heavy duty.

The eccentric shafts actuating the cams are of high Carbon Steel of large diameter.

A hand-operated Stop Motion is provided to the Punch and Angle Shears.

The Machines are supplied complete with one Punch and Die, one set of Shear Blades, Fast and Loose Pulleys, Belt Shipper, Spanners, etc.

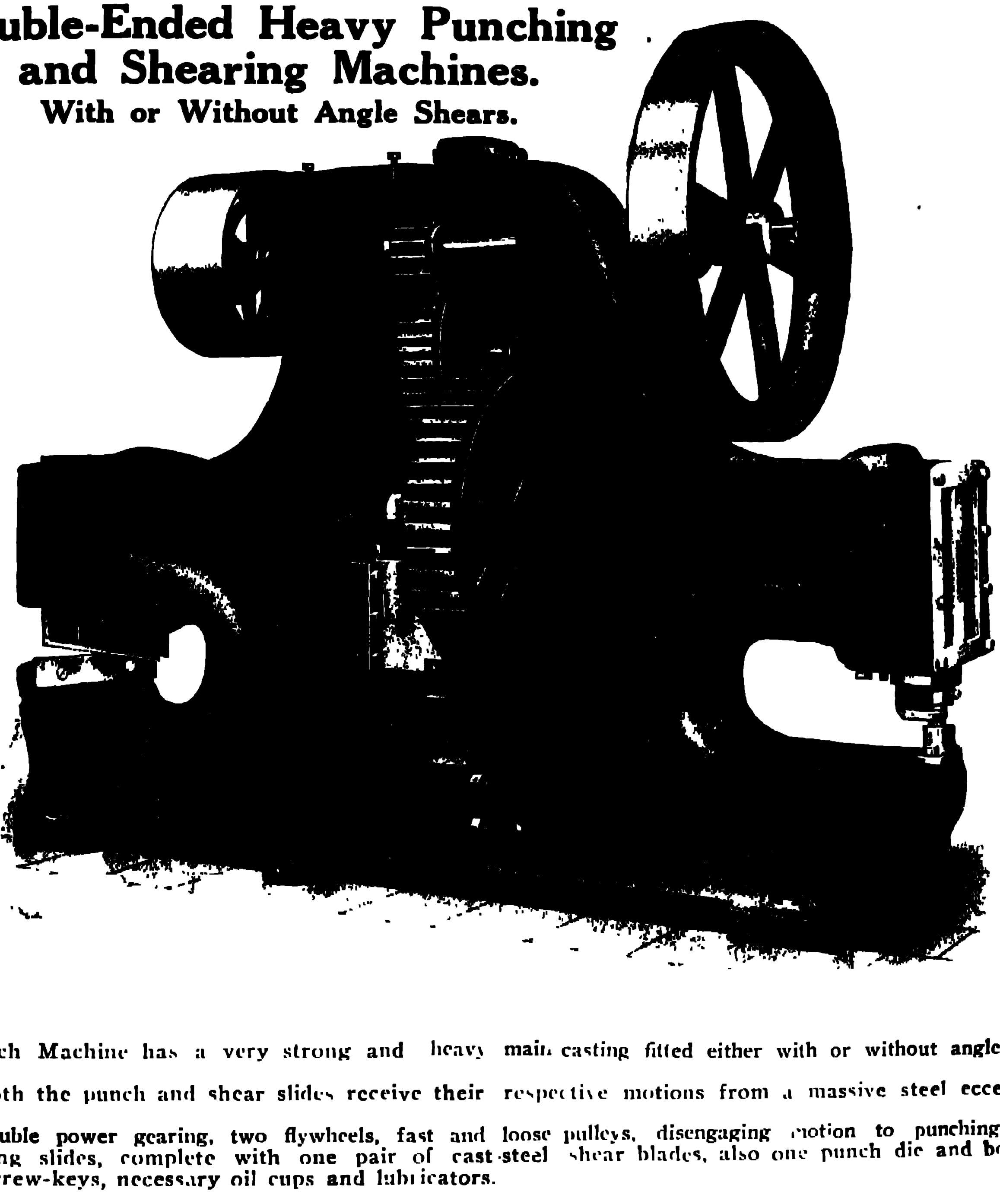
Dimensions.

Depth of Gap.	To Punch	To Shear	To Shear Angle Irons.	Pulleys	Pulley Speed.	Strokes per In.	Without Angles.		With Angles	
							Weight.	Price.	Weight	Price
Ins.	Ins		Ins.	Ins.			cwts.	Rs.	cwts.	Rs.
7	½ thro' ⅜		2 × 2	14 × 3	100	20	13	900	14	1,090
9	½ " ⅜	⅜	2 × 2	14 × 3	100	20	14	930	15	1,120
9	⅝ " ½	½	2½ × 2½	16 × 3½	110	20	19	1,070	20	1,270
10	⅝ " ½	½	2½ × 2½	16 × 3½	110	20	19½	1,100	20½	1,300
10	⅝ " ⅝	⅝	3 × 3	18 × 3½	110	20	28	1,380	30	1,650
12	⅝ " ⅝	⅝	3 × 3	18 × 3½	110	20	29	1,420	31	1,690
12	¾ " ¾	¾	3 × 3 × ⅝	24 × 4	130	20	39	1,680	43	2,000
14	¾ " ¾	¾	3 × 3 × ⅝	24 × 4	130	20	40	1,740	44	2,060
16	⅞ " ⅞	⅞	× 3½ × ⅝	24	140	20	60	2,240	64	2,580
18	1 " 1	1	× 4 × ⅝	20	375	18	77	2,880	81	3,260

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** **RANGOON, MADRAS, BOMBAY, LONDON.**

Double-Ended Heavy Punching and Shearing Machines.

With or Without Angle Shears.



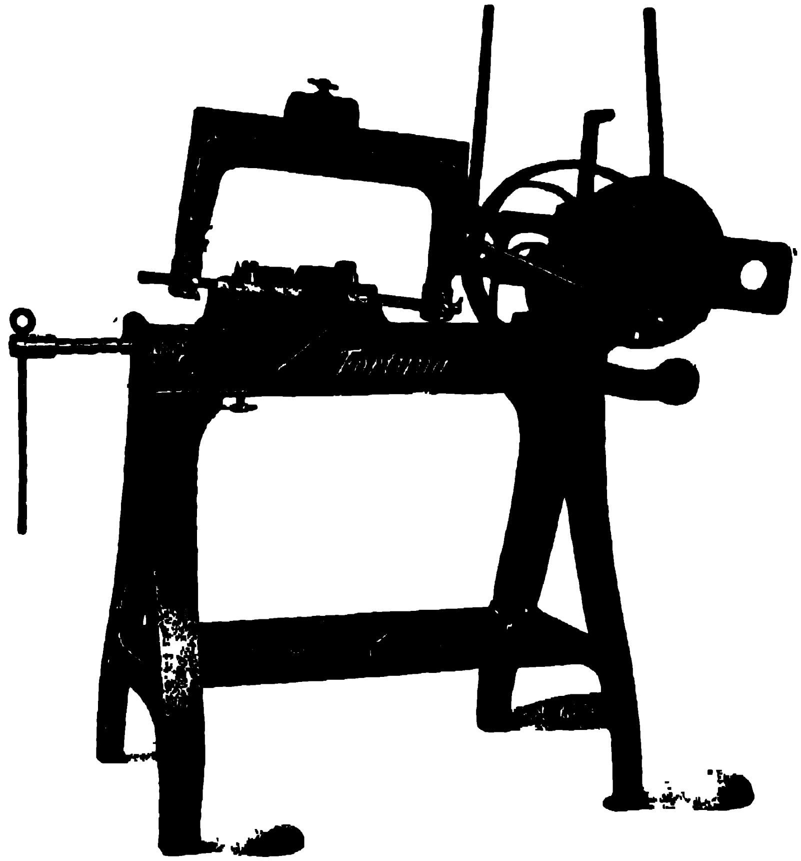
Each Machine has a very strong and heavy main casting fitted either with or without angle iron shear.

Both the punch and shear slides receive their respective motions from a massive steel eccentric shaft.

Double power gearing, two flywheels, fast and loose pulleys, disengaging motion to punching and shearing slides, complete with one pair of cast-steel shear blades, also one punch die and bolster and screw-keys, necessary oil cups and lubricators.

Depth of Gap.	To Punch.	To Shear	Distance from Edge of Plate. Punch	Distance from Edge of Plate. Shear.	Will Shear Angle Iron.	Price, Belt Driven only.	Approx Weight.	Price, without Angle Iron Shears.	Approx. Weight.	H. Po Req
Ins.	Ins	Ins.	Ins.	Ins.	Ins.	Rs.	Cwts.	Rs.	Cwts.	
20	1×1	1	20	20	5×5	**5,600**	150	**5,120**	140	18
24	1×1	1	24	24	5×5	**6,080**	165	**5,600**	155	18
27	1×1	1	27	27	5×5	**6,560**	190	**6,080**	180	18
24	1¼×1¼	1¼	24	24	6×6	**7,760**	230	**7,280**	220	
27	1¼×1¼	1¼	27	27	6×6	**8,300**	250	**7,820**	240	
30	1¼×1¼	1¼	30	30	6×6	**8,860**	270	**8,380**	260	25
30	1½×1½	1½	30	30	7×7	**12,480**	370	**11,920**	355	30
36	1½×1½	1½	36	36	7×7	**13,400**	410	**12,840**	395	30

The New "Fortuna" Power Hack Saw.



Belt Driven.

The Saw Frame works on accurately machined, adjustable V-slide bearings, giving the Saw Blade a perfect and steady guide.

The Saw Blade can be used on its full length, as the length of the stroke is adjustable from 3 to 8 inches.

The machine stops automatically after completion of cut.

Cutting capacity 6 by 6 ins.
Length of Saw Blade 12 ins.
Stroke adjustable from 3 to **8 ins.**
Size of Pulley 12½ by 2½ ins.
Pulley Speed 60 to 70 R.P.M.
Floor Space 48 by 20 ins
Approx. nett weight 1½ cwts.

Price, complete with Universal Vice and one dozen Saw Blades. **Rs. 255.**

The "Limitax" Rail and Girder Saw.

Operated by Hand.

The "Limitax" Rail Saw has been designed to be taken direct to the job, and meets the requirements of Railway and Tramway Companies, Constructional Engineers, etc.

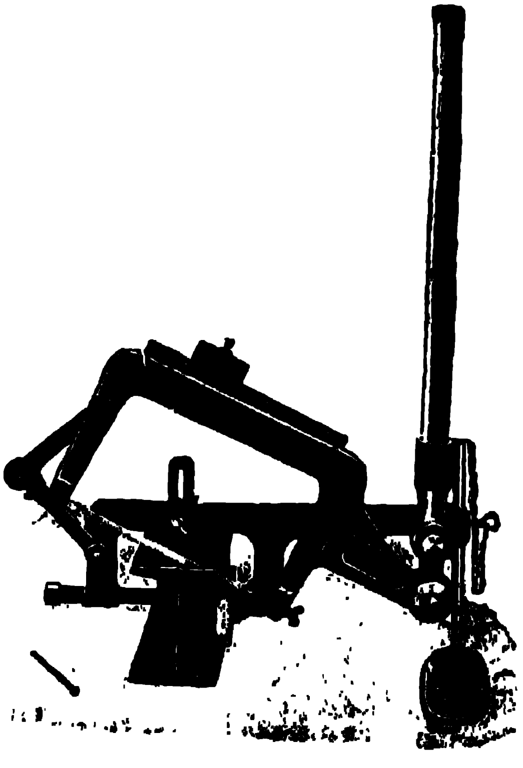
Accurate cut is guaranteed, and there is no trimming required.

Capacity 9 by 9 ins.

Length of Blade 14 ins.

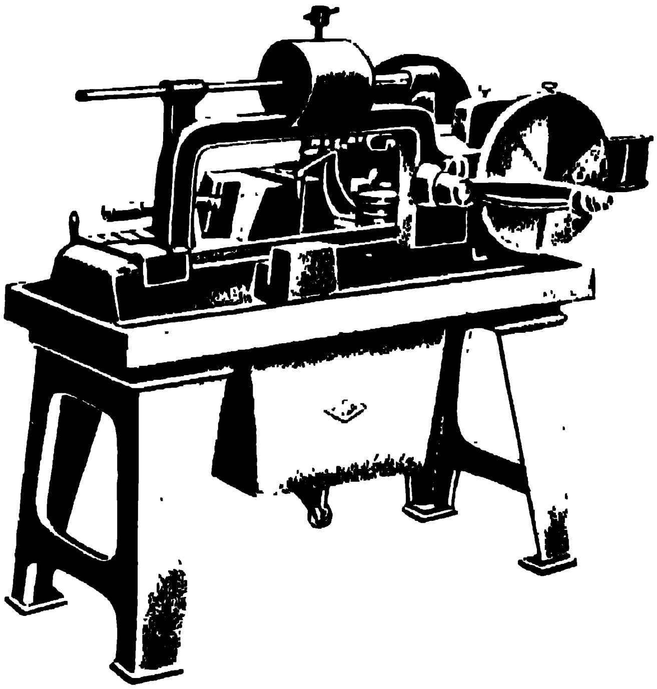
Approx. nett weight 70 lbs.

Price, Rs. 215.



New No. 10 High-Speed Hack Saw.

Cast-Steel Bow, Adjustable Stroke, Auto-Suds Pump, Auto-Relief and Quick Lock to Bow.



This machine has been entirely re-designed and combines the leading advantages of the previous model with several distinctive features. The arrangement of bow and slide and driving connections, which have proved so satisfactory, are retained. A simple and positive mechanical relief on the idle or return stroke of the saw frame is now fitted. This is attained without the use of hydraulic or oil rams or dashpots and their attendant troubles, and in the event of a blade breaking prevents injury to the machine. The saw frame may be lifted to any convenient height for inserting the work, and there instantly and securely locked. This feature is of great convenience in setting the machine.

The sud tank and pump are arranged as a separate unit and may be removed for cleaning and replaced in a few minutes.

The sud pump fittings are also greatly improved, and the machine may be run for long periods without the cooling solution being fouled by cuttings. **The saw frame and all parts liable to fracture are steel castings.** The adjustable stroke and quick acting vice remain as before.

We claim a high efficiency for this machine on all stock cutting operations within its capacity of 7 inches round or 6 inches square bars.

Blades, 14 inches by 1 inch. Countershaft Pulleys, 10 inches by 100 R.P.M.

Weight, 5 cwts. Stroke, 4 inches to 8½ inches.

Price, Rs. 720.

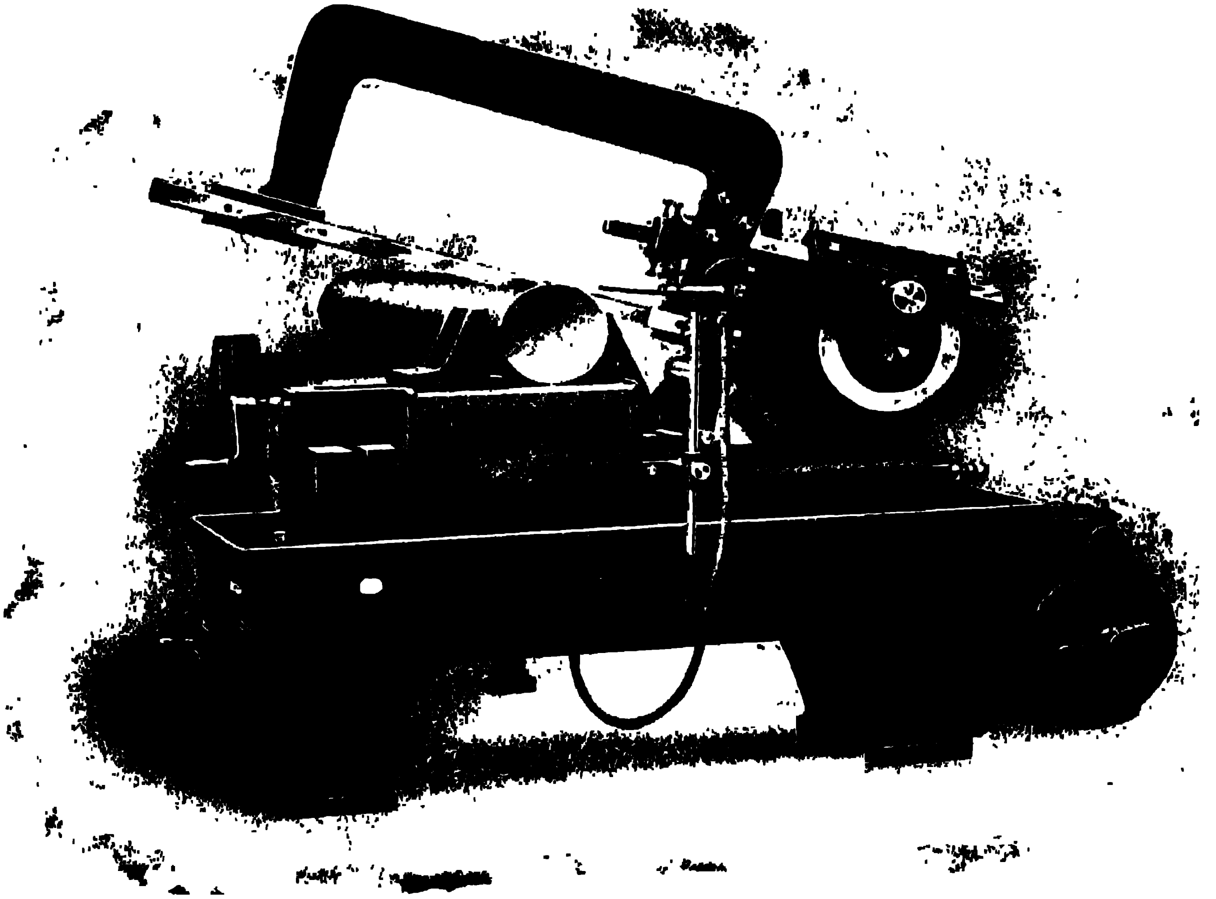
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

High-Speed Hack Sawing Machine.

For Belt or Motor Drive.



Showing No. 2 HEAVY DUTY RAPID HACK SAWING MACHINE for Motor Drive and Roller Stand for supporting long work.

These Machines are fitted with patent Eccentric Motion, which periodically changes the inclination of the Saw and keeps it cutting at a corner of the work, thus ensuring rapid cutting without the use of Heavy Weights.

They are entirely self contained and portable, and thus can be used in any part of the works. They can also be swivelled round for cutting long joists and structural steel at any angle.

Automatic Stop Motion is fitted to the Machines, which throws the belt on to a loose pulley at the end of the Cut, or sooner if desired.

The Vice is of the quick-acting type, and can be set at any angle.

Accessories and Equipment include Lubricating Pump and all fittings, Vice, necessary Spanners and one Saw Blade.

		No. 1	No. 2	No. 3
Cuts round bars up to diameter		6"	9"	14"
Cuts sections up to ..		6"×6"	12"×8"	20"×12"
Size of Blades used ..		12" to 14"	14" to 21"	17" to 24"
Approx. Nett Weight ..		690	920	1,900
„ Gross „ .		880	1,050	2,550
Price, Belt Drive	Rs.	**925**	**1,235**	**2,940**
„ Roller Stand ..		**112**	**112**	**224**
„ Two Speed Countershaft		**336**	**336**	**378**

Motor Drive and Electric Equipment on application.

Cold Sawing Machines, for Belt or Motor Drive.

30-in. Cold Sawing Machine.

Designed for rapidly Sawing Steel Joists, Channels, Tees, Angles, Rails, Bars, etc.

The Machines are of powerful construction, specially designed to obviate vibration and produce work in the quickest time.

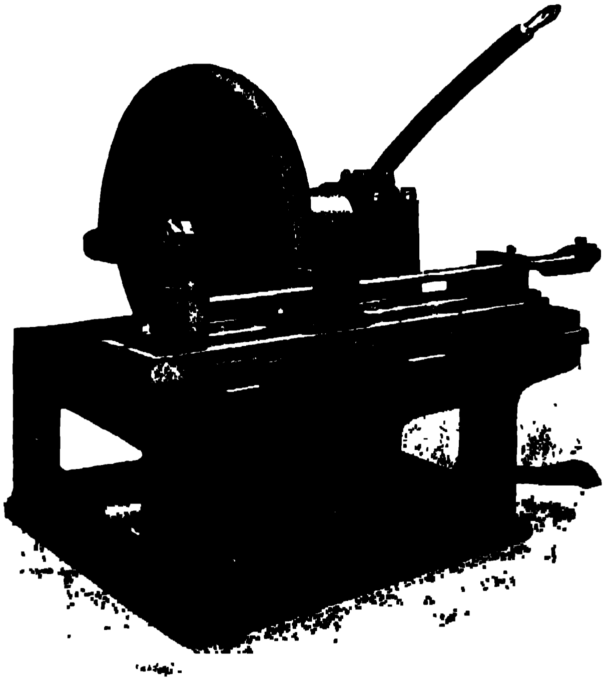
The Tables carrying the work are stationary, the Saw having variable hand self acting feeds through the work, and by lever movement the Saw is rapidly traversed back by power, ready for the next cut. Automatic Stops prevent over-running in either direction. The Tables have Slots for holding the work and the Side Table has screw adjustment, so that heavy work may be finely adjusted for sawing off exact lengths. Work can be sawn off at any angle.

The Saw is mounted on special flange, carried on spindle of hardened steel running in adjustable phosphor bronze bearings, and driven by phosphor bronze wheel and hardened steel worm running in continuous oil bath.

Accessories and Equipment include Tank for Suds, Fast and Loose Pulleys, one Clamp and Bolts, one Circular Saw and necessary Spanners

Diameter of Saw	24"	30"	36"	42"
Will Saw Joists, Channels, etc.	24" × 6"	28" 8"	30" × 10½"	—
" " " Squares, etc.	6"	8"	10½"	12"
Main Table, length and width	5' 2" × 1' 9"	–	7' × 2' 6"	9' 5" × [illegible]
Side Table " " "	2' 10" × 1' 6"	–	4' × 2' 8"	5' × 3
Approximate Nett Weight	Cwts. 45	70	110	170
" Gross "	55	80	130	190
Price	**Rs. 5,550**	**Rs. 6,930**	**Rs. 9,380**	**Rs. 13,580**

Hot Sawing Machine (Smithy Type).



The Table slides to and from the Saw, being operated by Hand Lever and Treadle as shown, an adjustable stop being furnished to limit the length of stroke. Three movable Rests are bolted to Table for carrying the Bars to be cut. The Central Rest supports the work on each side of the Cut. An adjustable Stop enables any number of pieces to be cut off to the same length.

The Saw fits to an improved Flange, and is securely held. The Spindle is of special Carbon Steel, and runs in large adjustable Gun-metal bearings. All bearings are fitted with Dust-proof Lubricators.

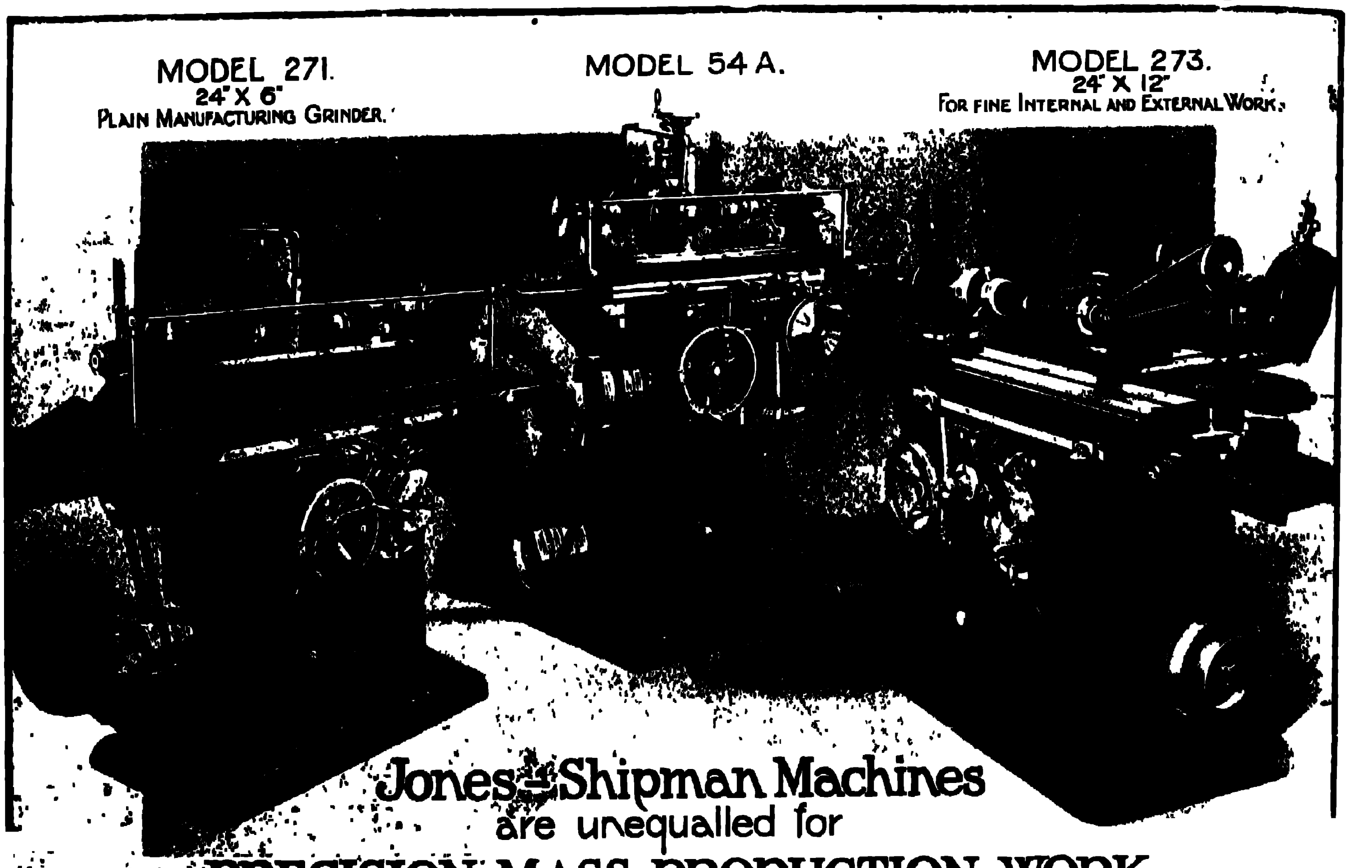
Accessories and Equipment include Countershaft with Fast and Loose Pulley, and Belt Striking Gear, One Saw and Spanners

		No. 1	No. 2
Diameter of Saw		36 ins.	42 in
Approximate Nett Weight	Cwts	40	45
" Gross "	"	47	35
Price		**Rs. 4,480**	**Rs. 5,060**

CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.


MODEL 271.
24" X 6"
PLAIN MANUFACTURING GRINDER.
MODEL 54 A.
MODEL 273.
24" X 12"
FOR FINE INTERNAL AND EXTERNAL WORK.

Jones & Shipman Machines
are unequalled for
PRECISION MASS-PRODUCTION WORK.

MANUFACTURED ONLY BY
A.A. JONES & SHIPMAN LTD. LEICESTER. ENGLAND.

"Jones-Shipman" Grinding Machines are built from interchangeable standardised parts, all of which are manufactured in quantities in the maker's own Works. This quantity production method makes so considerable a saving in cost that they are able to give many advantages both in material and design over any other maker.

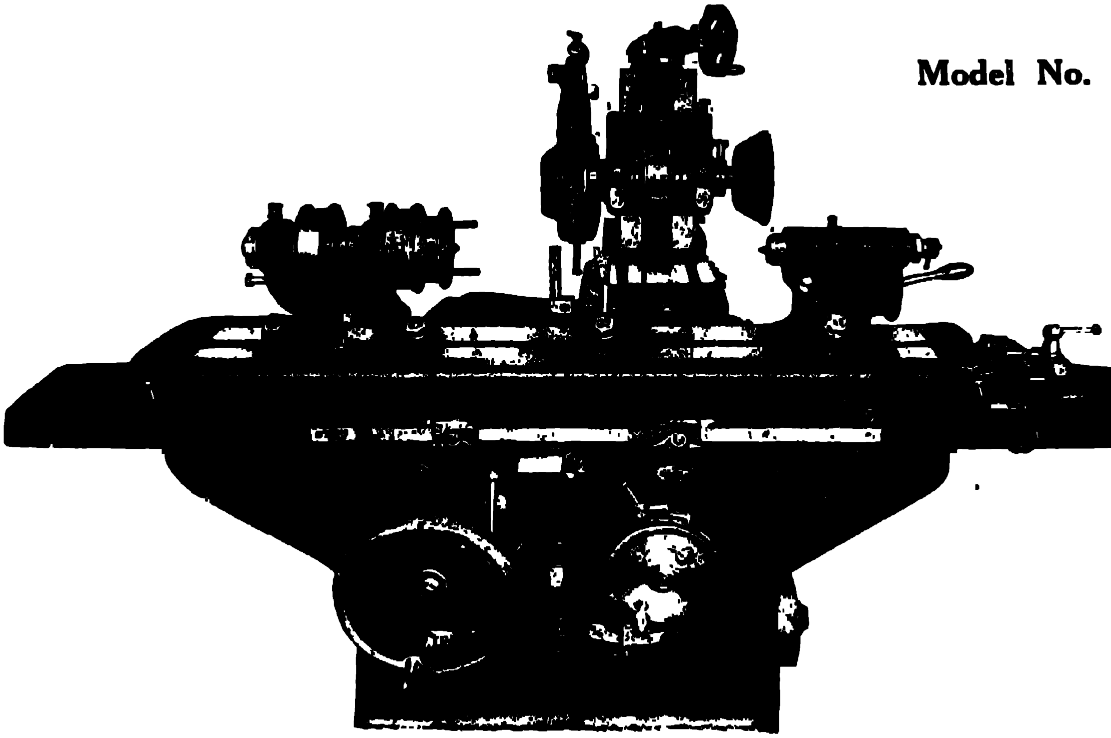
During the unusual stress of war conditions, when the demand was for machines embodying extreme accuracy combined with comparative indestructibility under the whole time (day and night) running, the makers designed important improvements which are incorporated in the machines we offer to-day, bringing them not only well in front of any similar competitive machines, but maintaining them at that particular point of harmonious excellence which makes for the perfect running of every part of the machine.

The production of a perfect Girder is only possible by the steady elimination (over a series of years) of every point that fails to maintain a high degree of accuracy under service conditions. This has been our persistent policy, with the result that all the models now offered are the most up-to-date of their kind, and indispensable in any workshop where accurate grinding work at high-output rates of speed is required to be done.

Special Grinding Machines, designed to suit the requirements of any customer, can be promptly made, the stock of standardised parts in all sizes enabling exceptional facilities for the rapid manufacture of Machines for special purposes.

"Jones-Shipman" 24 by 12 ins. Universal Grinding Machine with Tool and Cutter Equipment.

Model No. 270.



Special Features.

The table traverse is automatic, with eight variations of travel speed, lowest 15 ins, highest 109 ins. per minute.

The cross slide on which the wheel head is mounted carries a top slide, which may be set round to any degree, a scale reading the position from 0° to 90° both ways; the grinding wheel can also be brought right over the table with the spindle either parallel or at right angles to the table slide-ways

The Cross Feed is automatic and variable, the wheel being advanced into the work at 0002 ins for each reversal of the table to a maximum of 0016 ins.

Automatic sizing of work is attained by setting the adjustable knock out to the required diameter, and engaging the automatic cross-feed, which is instantly stopped when the wheel has advanced the pre determined distance.

The Wheel Head has a vertical adjustment by screw through hand-wheel and bevel gearing of 7 ins., the graduations reading to .0005 ins. Provision is made to carry wheels on either end of the spindle, which is finished with the highest degree of accuracy. The bearings are best phosphor bronze, self-oiling, adjustable and dust-proof.

Dimensions.

Capacity between centres ..	12" diam 24" long.	
Length of table traverse ..	24"	
Size of wheel (disc)	10"×1"	
Wheel speeds (from 1560-3860 R.P.M.)	three	
Work speeds (from 72-276 R.P.M.)	eight	
Will grind taper to included angle	38°	
Cross traverse of wheel slide ..	6½"	„
Min. dist. centres wheel and work	0"	„
Vert. movement of head	7"	„
Speed of countershaft	500 R.P.M	
Fast and loose pulleys	12"×3"	
H. P.	4½	
Floor space ..	96"×52"	
Price	**Rs. 7,520**	

Equipment.

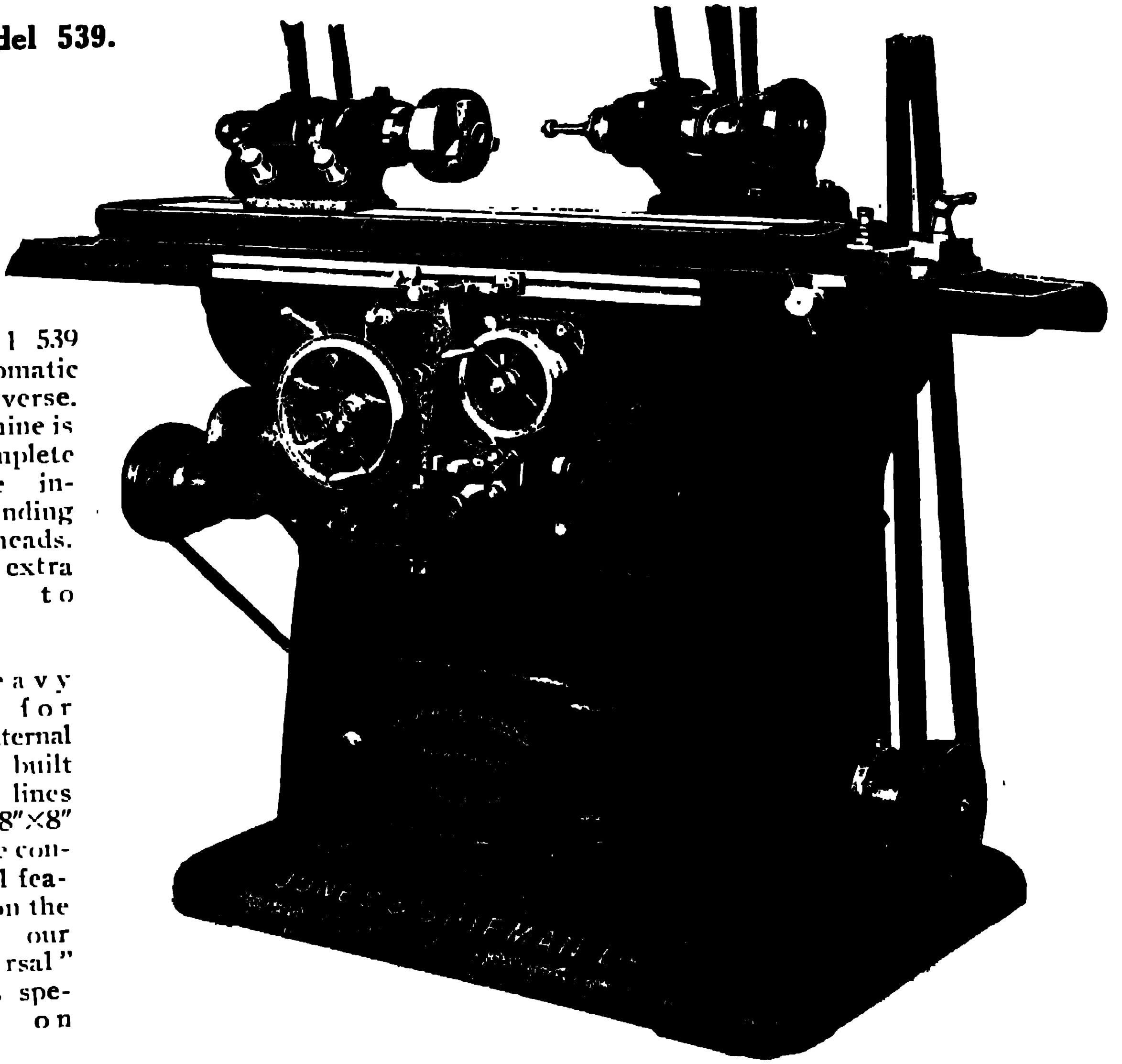
The standard equipment furnished with each 24×12 machine consists of the following

- Universal work head (204)
- Centre tail stock (7.3)
- 5 grinding wheels.
- 1 set of carriers (111).
- Universal vee clamping fixture (102)
- Wheel trueing device (8)
- 2 tooth rests (113).
- Universal vice (114)
- Centre height gauge (115)
- Water guards.
- Necessary spanners.
- Treble countershaft (77B).
- Universal wheel head (201)

Internal Grinding Attachment high-speed Barrel Head and spindle (see page 613) is supplied as an extra. This bolts on the facings provided on the main wheel head, which then only requires to be swung round into position to bring it into work.

"Jones-Shipman" 24 by 8 ins. Internal Grinder.

Model 539.



Model 539 with automatic Table Traverse. This machine is not complete with the internal grinding spindle heads. These are extra according to size.

A heavy machine for general internal grinding built on similar lines to the 18"×8" model. The constructional features are on the lines of our "Universal" models as specification on page 611.

Dimensions.

Table working surface	.	30½" × 5"
Length of table traverse	..	24"
Swing over table	.	8"
Height from floor to work centres		42½"
No. of work speeds (102-605 R.P.M.)	. ..	four
No. of rates of table speeds (23" to 72" per min.)	. ..	four
Will grind max. length of hole	..	12"
Traverse of cross slide	..	6"
Size of base		38" × 20"
Speed of countershaft driving pulley ..	.. ..	500 R.P.M.
Fast and loose pulleys	..	8" × 2¼"
H. P.	.. .. ..	2½
Working area	.. .	80" × 44"

Weights and Dimensions.

Approx. nett weight—machine	.	19 cwt. 2 qrs. 0 lb.	
" gross " "	.	23 " 3 " 0 "	
" measurement "	..	56" × 53" × 41"	
Price	**Rs.**	**3,200.**	

Equipment.

Work Head, No. 200, with 1¼" live spindle including latest type improved phosphor bronze taper adjustable dust proof bearings with double ball thrust.

Wheel Trueing device for carrying diamond (216).

(Diamonds extra according to size and quality). Water Pump, Tank and Fittings. Double countershaft. (169).

Cabinet (incorporated in column), Key Wrenches. (18).

Two double end Hexagonal spanners.

The Internal Grinding Spindle Head is an extra according to the one selected. Any of the following are suitable: —

Head No.	Spindles and Barrel No.	Suitable for holes.
172	45	¼" to ¾" diam. × 2" long.
172	83	¾" " 2" " × 3½" "
172	103	¾" " 2" " × 3½" "
205A	33	7" " 5" " × 6" "

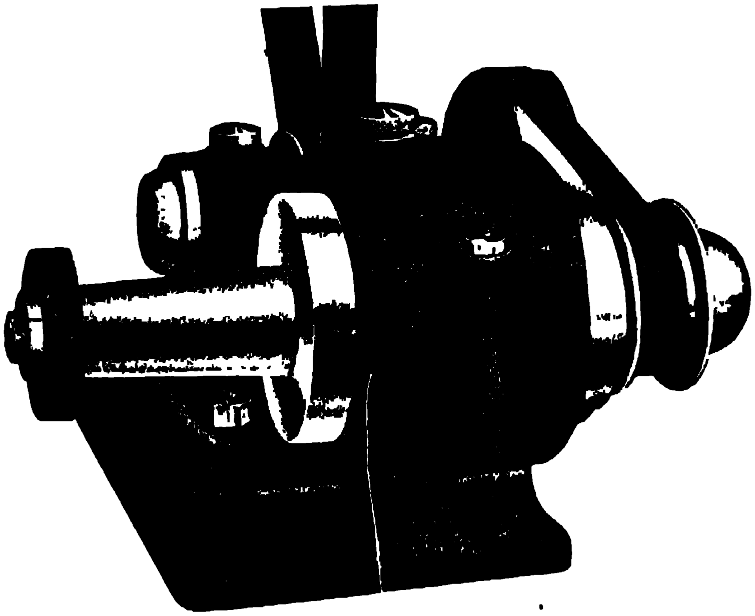
For fuller particulars of Spindle Heads see page 613

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Examples of Equipment for " Jones-Shipman " Grinders.



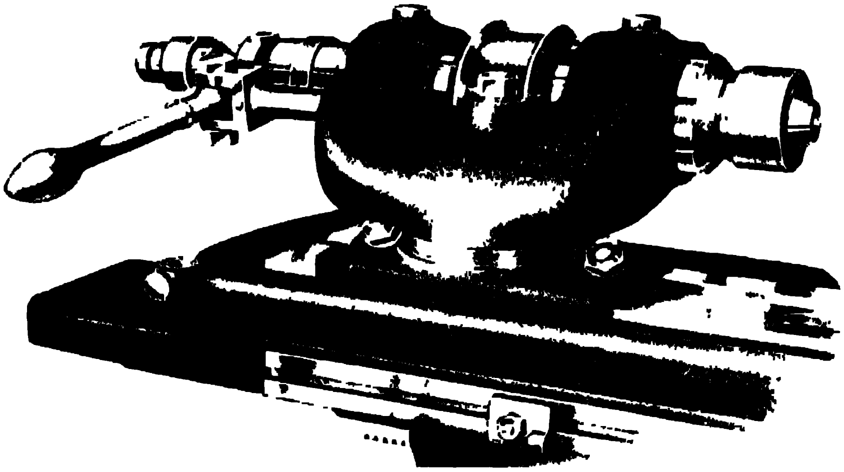
No. 205A.

Large Internal Grinding Head.

Carrying No. 33 spindle for holes 2" to 5" diameter and up to 6" deep.

Suitable for the 24"×8" and 24"×12" machines

An accurately built head of great solidity built to run at 5,000 revs and to work within close limits up to 0001.



No. 82.

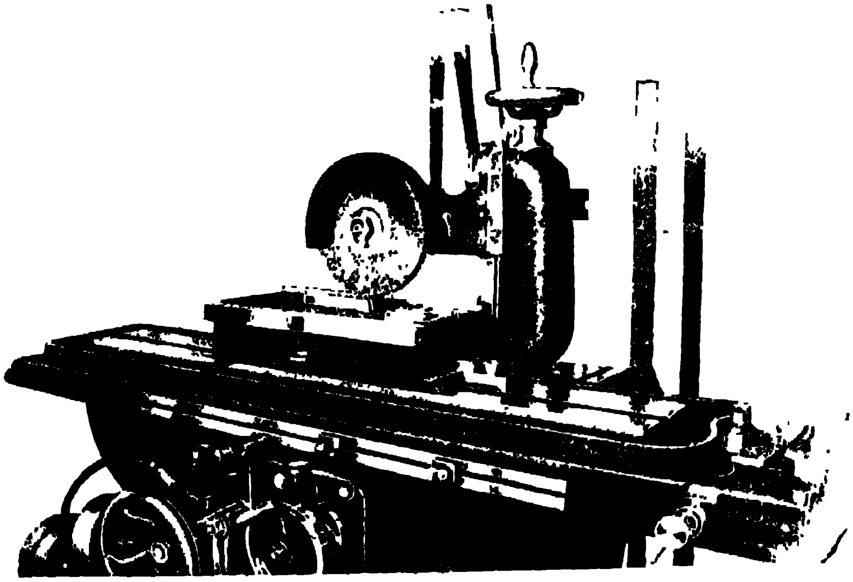
Swivel Live Work Head with Spring Collets.

Suitable for 18"×8" and 24"×8" Grinding machines This fixture enables the operator to change pieces instantaneously and gives great saving of time, the machine being thus engaged on effective operation the whole time. Swivels to 90° each day.

No. 183.

Surface Grinding Attachment.

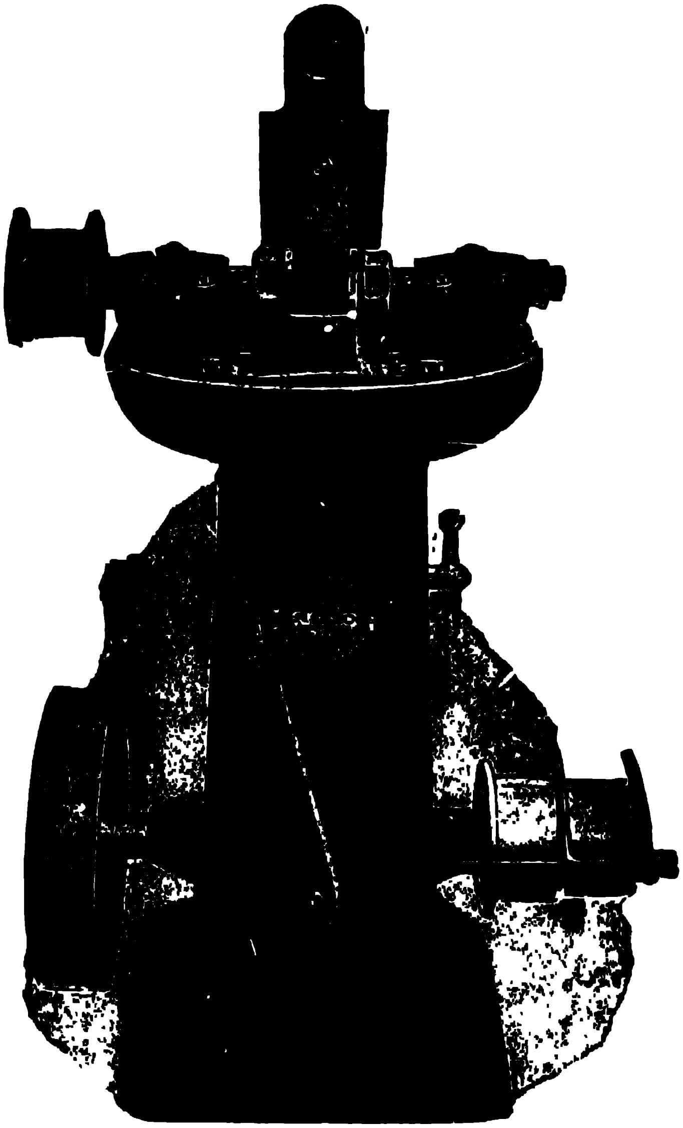
Generally used in connection with a magnetic chuck for surface grinding. Is suitable for use on 18"×8", 24"×8" or 24"×12" • Grinding machines. The Wheel Head is mounted on the cross slide at a right angle with the table, it is adjustable as to height, and will traverse the full width of the table.



"Rego" Grinding Machines.

Jones and Shipman, Limited.

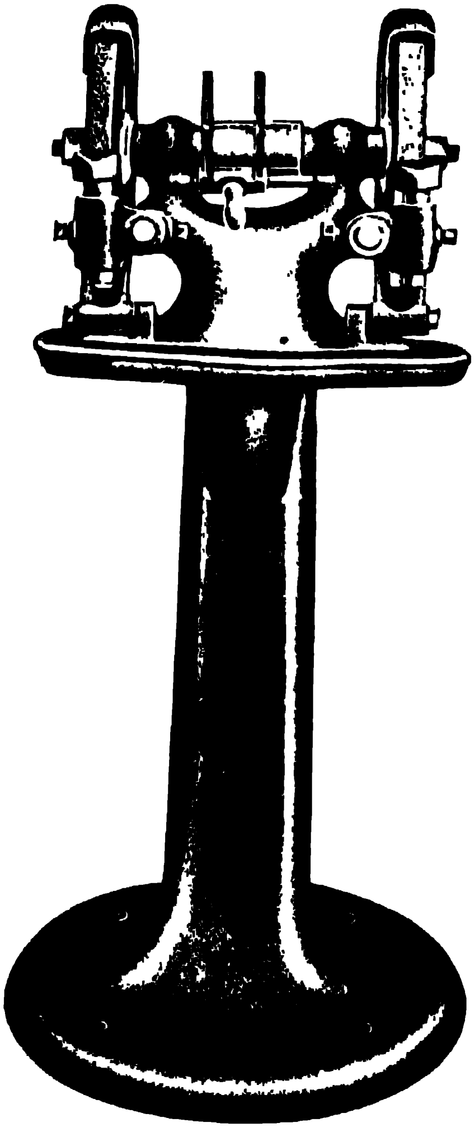
14-in. Improved Wet Tool Grinder.



This Machine embodies the latest design for wet tool grinder, having self-contained water supply regulated by hand lever at the side of the column and is complete with self-contained countershaft. The spindle is of ample proportion and runs in self-oiling bearings that are adjustable for wear, takes wheels up to 14" diameter by 2" wide The pulley on the spindle is driven from a self-contained countershaft, which runs at 325 R P M. and is fitted with 6" diameter fast and loose pulleys and belt striker. The weight of the complete Machine is approximately 450 lbs.

Price, Rs. 620.

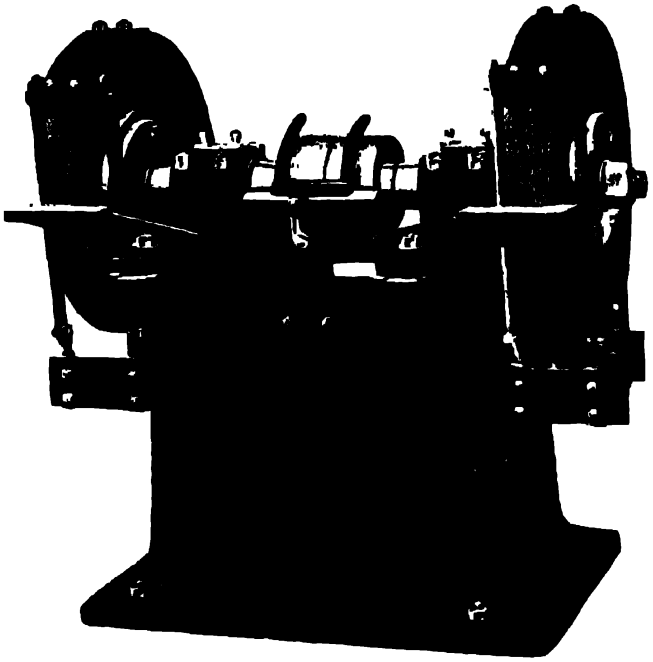
8-in. Improved Emery Grinder.



This grinder is substantially built and furnished with rigid rests which form steady supports and are adjustable to size of wheel in use. The spindle is ¾" diameter and runs in gun-metal self-oiling bearings. The headstock is mounted on column with tray and water pot. Takes wheels up to 8" diameter by ¾" wide. The pulley on the spindle is 2"×¼", pulley on countershaft is 8"×1½" and runs at 600 R.P.M. The weight of the Machine complete with countershaft is approximately 120 lbs.

Price, Rs. 355.

24-in. Double Dry Grinding Machine.



This machine will be found all that is required for most classes of work of a heavy to a medium heavy nature

The base or body is carefully and substantially designed, giving great rigidity and strength with freedom from vibration when running, thus ensuring maximum grinding output and longer life of both machine and wheels.

The height to centre is 32 ins. and the distance between the wheels 34 ins. The Spindle is of tough carbon steel, 2½ ins. diam running in adjustable and renewable dust-proof ring-oiling bearings 10 ins. long, having two rings per bearing and provision for taking up end wear, when required. The floor space occupied is 47 ins. by 31 ins.

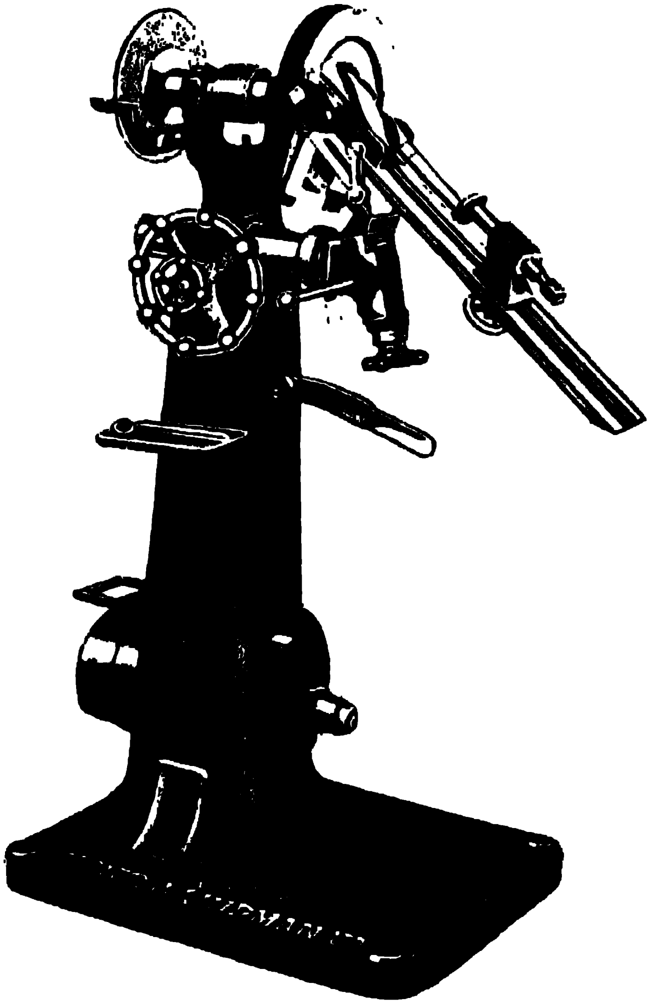
The wheels are 24 ins diam. by one 3 ins. and one 2 ins. thick.

Adjustable Steel Safety Guards, arranged to follow the wear of the wheels, can be fitted at extra cost. The design of the guard is so arranged that the top plate can be easily and quickly removed to enable long and bulky articles to be ground, which require a larger area of the wheel exposed.

Complete with Wheels.	Approx. Weight.	Price.
With fast and loose pulleys on the wheel spindle, 8 ins. diam. by 4 ins. wide, to run 800 revs. per minute, and belt guide For **Direct Drive**	1,150 lbs.	**Rs. 1,820**
With fast pulley only on the wheel spindle, and **Overhead Countershaft,** having fast and loose pulleys, 8 ins. diam. by 4 ins. wide, to run 355 revs. per minute, and belt-striking gear.	1,300	„ **1,975**
Extras, if required:—		
Adjustable steel **Safety Guards** to both wheels.	90	„ **270**
Patent **Dust Collecting Rests,** complete with exhausting Fan.	280	„ **500**

Model 102 Universal Twist Drill (Dry) Grinder.

Jones and Shipman, Limited.



For Drills up to 2½ ins.

This machine will deal with any shape of drill within its capacity, and will grind the cutting lips to any desired angle ranging between 100° and 132° included angle.

The standard angle for drill points is 118° included angle or 59° half angle This machine gives a variation of 14° above and 18° below the standard. These adjustments are indispensable when grinding drills for use on soft materials.

Any desired clearance can be given to the lip by a simple adjustment of the drill holder.

The bearings are self-oiling, adjustable and dust-proof, with special provision for taking up end play on the spindle.

Dimensions.

Diam of grinding wheel	..	9½"
„ point thinning wheel		8"×5/16"
Revolutions per minute ..	..	1060
Fast and loose pulley ..	..	7"×2"
Speed of ditto in R P.M.	..	300
Nett weight, lbs. ..	.	200
Price		**Rs. 740**

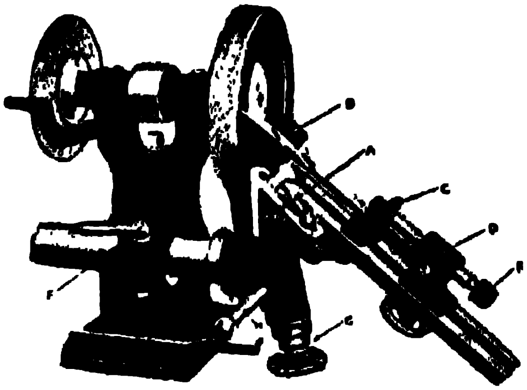
Model 103 Standard Angle Plain Bench Type Dry Twist Drill Grinder.

Jones and Shipman, Limited.

For Drills ¼ in. to 2¼ ins.

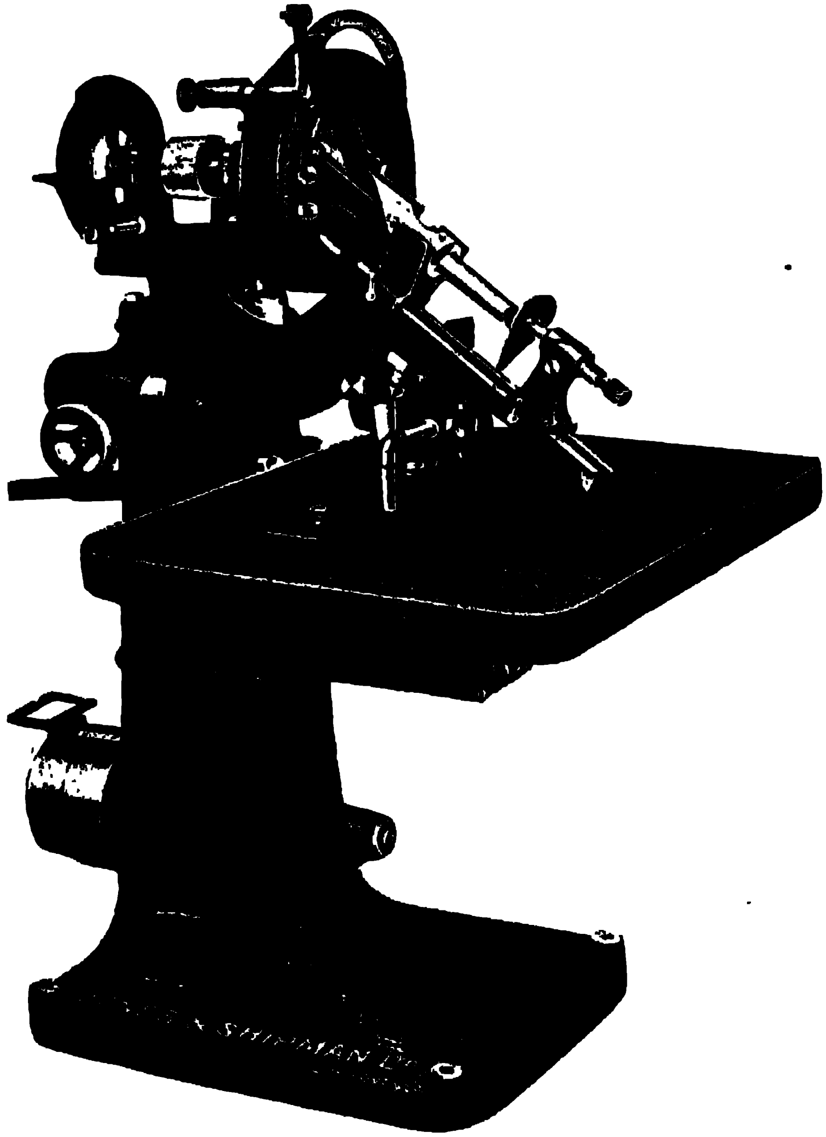
These machines grind all sizes of drills from ¼ in. to 2½ ins. diameter, at the standard included angle of 118° and are furnished with variable clearance gauge, accurately graduated.

Diameter of grinding wheel	..	..	9½"
Revs. per minute ..	..	..	1060
Approx nett weight ..	..	..	70 lbs.
Price		..	**Rs. 485**



Model 386 Standard Angle Heavy Type Wet Twist Drill Grinder.

Jones and Shipman, Ltd.



Giving Fixed Cutting Angle of 118°.

(Included Angle).

For Drills ¼ in. to 2½ ins.

These machines are specially designed for simplicity and accuracy in operation, all intricate adjustments having been eliminated.

The Drill holder is so constructed that the drill is automatically positioned for the correct point angle whatever its diameter within the capacity of the machine. The clearance angle may be readily varied to suit different classes of work.

The wheel Spindle is mounted in long gun-metal self-oiling bearings and adjustments are provided to eliminate end play.

Wheel Truing is effected by an attachment for carrying a diamond in an adjustable holder attached to the wheel guards. This is swung clear when not in use.

Point thinning is done on the narrow wheel and rest at the left hand side of the machine.

A pump is fitted inside the water guards and provides a steady and adequate volume of coolant to the drill point and the guards effectively prevent any splash or spray wetting the floor

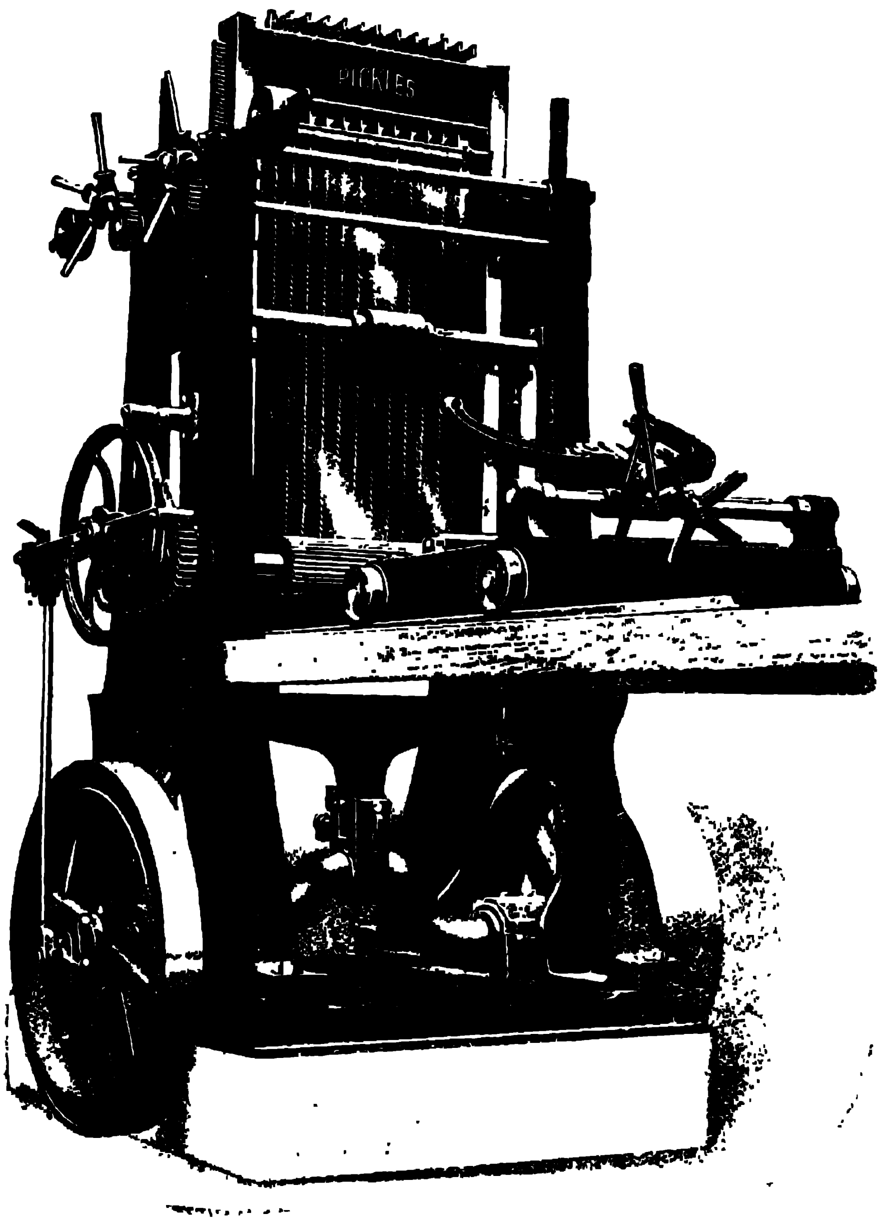
Dimensions.

Spindle Speed, R.P.M.	1,344	Height to centre of Spindle	44 ins
ize of Cup Wheel ..	10½ by 2¼ ins.	Capacity for Drills ..	¼ to 2½ „
„ „ Point Thinning Wheel	8 „ $\frac{5}{16}$ „	Size of Base ..	24 by 22 „
Speed of Countershaft, R.P.M..	380	Approx. Nett Weight ..	5¼ cwts
ast Pulley Size ..	7 by 2 ins.	Price	Rs. 880

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Improved Log Frame or Combined Log and Deal Frame.

Self-contained Type, Roller or Rack Feed.

For Sawing Round or Square Logs into Deals or Boards, representing the latest and most compact design Roller Feed Log Frame with main frame of massive construction throughout, arranged to carry a large number of Saws for cutting Logs into Deals or Boards as required.

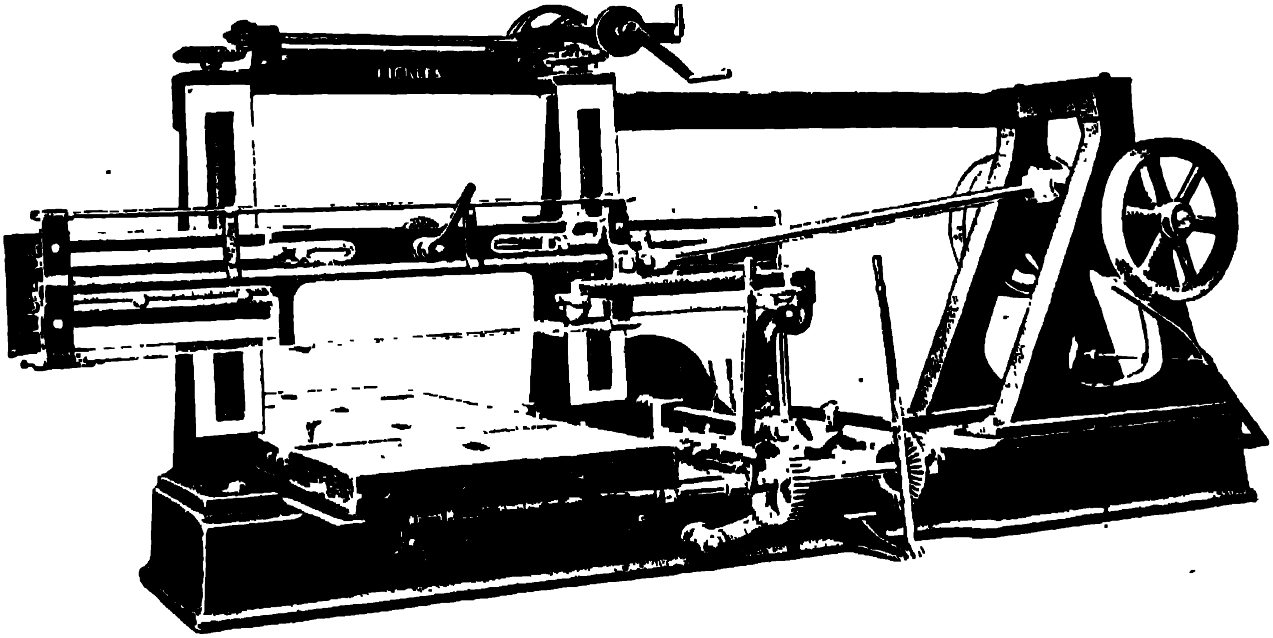
Dimensions.

No.	Size of Log.	Size of Pulleys.	Revs per Minute.	Approx. Weight	Price with Roller Feed.	Price with compound Roller Feed	Price with Rack Feed.	Extra for Deal Sawing Apparatus with Roller Feed
				Tons.	Rs.	Rs.	Rs.	Rs.
3	24 ins. × 30 ft.	36 ins. × 6	220	7	11,400	12,920	12,920	
	30 ,, × 30 ,,	42 ,, × 6	200	8	13,680	15,200	15,200	1,520
5	36 ,, × 30 ,,	48 ,, × 6½	170	11	16,420	18,240	18,200	

Particulars and prices of other types on application.

High-Speed Horizontal Frame Sawing Machine for Logs.

FT.



The illustration shows a Left-hand Machine of the three largest sizes fitted with an Adjustable Crankshaft to rise and lower in conjunction with the Saw. Sizes Nos. 0, 1 and 2 have a fixed Crankshaft.

This type of Log-sawing Machine is now in almost universal adoption for sawing hardwoods, where the finest quality of sawing is required, greatest possible saving by using thin saws, also perfectly accurate work and thus requiring neither re-sawing, nor even planing in many instances, but the resulting sawn boards finished direct by the panel scraper. For sawing native timber the Machine is invaluable, both for town or country saw mills and estate work, as medium skilled labour only is required to operate the machine and sharpen the Saws; the least possible power is required, whilst the high cutting-speed of the saw produces a reasonable output which, considering the quality of sawing, minimum waste in saw kerf, small driving power required, simplicity of operation and construction, makes this type of machine so popular as to be found in nearly all the largest and well-fitted saw mills throughout the world.

Dimensions.

No.	Size.	Max. Width between *Saw Guides.	Length of Table.	Size of Pulleys	R.P.M.	Approx. B.H.P.	Approx. Weight.	Price
							Tons.	Rs.
1	30 ins.	32 ins	30 ft	27 ins × 4¼ ins	300	10	8	12,920
2	36 „	39 „	30 „	30 „ × 4¼ „	280	12½	9	14,600
3	42 „	45 „	30 „	36 „ × 4¼ „	260	15	11	16,720
4	48 „	51 „	30 „	42 „ × 4¼ „	240	17½	12	18,240

*By removing the Saw-guides a further 3 ins. in width may be obtained, and this with the 9 ins. (approx.) above the Saw enables larger diameter Logs to be efficiently converted

Countershaft for driving Machines, Guide Pulleys or Gearing, etc., extra.

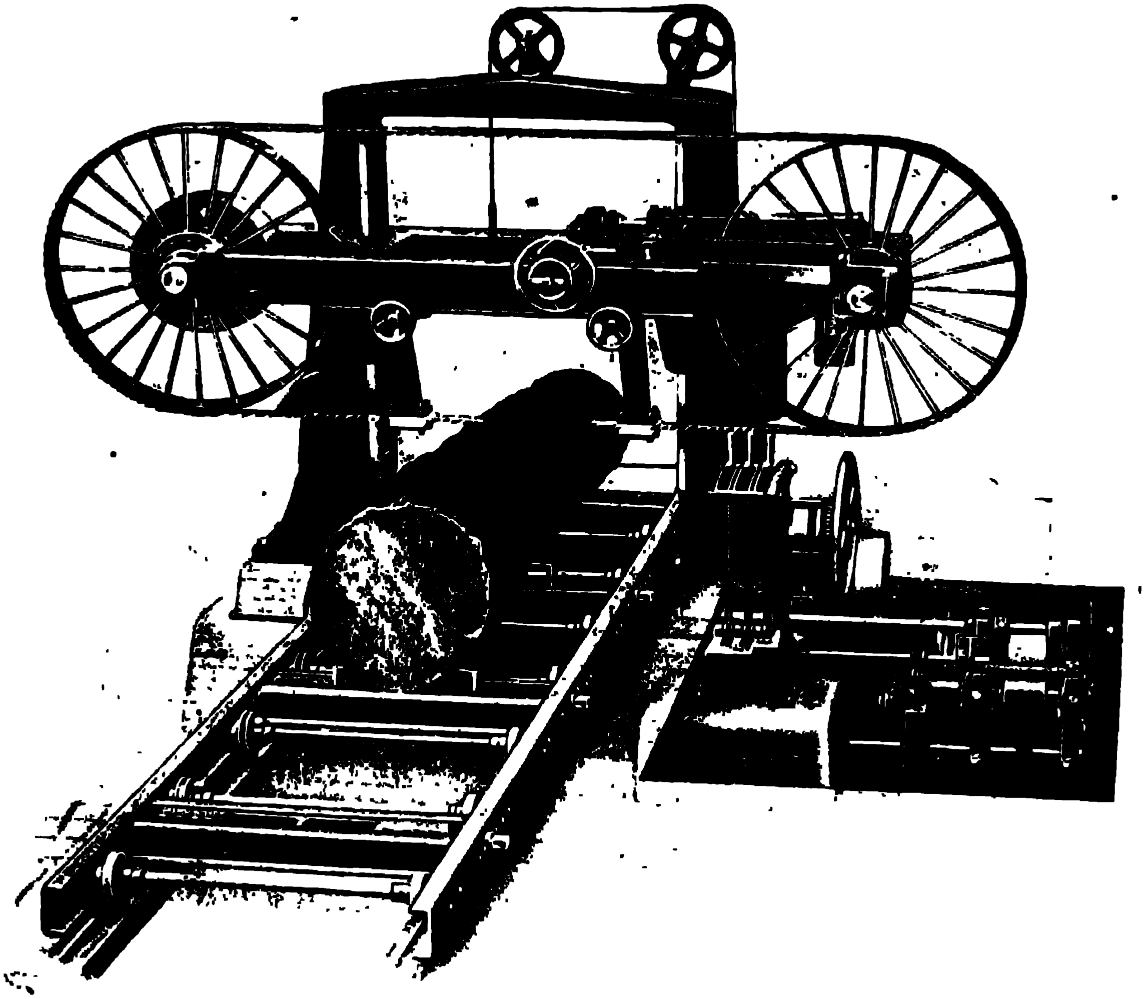
Note.—These machines are made either **Left or Right-hand.**

Particulars and prices of other types on application.

Horizontal Log Band Mill.

Belt Driven.

F.O.



This is the latest type of Sawing Machine for rapid and accurate conversion of large Logs, squaring, opening, quartering or sawing them into Flitches or Boards: combines the advantage of Horizontal Sawing with the continuous action of the Bandsaw, running at a speed of about 7,000 feet per minute, and using thin saws of 16 to 18 gauge, with consequent minimum waste when sawing valuable timber

Whilst the capacity of this machine is enormous the output necessarily varies according to the use thereof, whether for breaking-down purposes only or board sawing, in either hard or soft wood logs By means of a new instantly variable Friction Gear the Feed can be always maintained at the maximum rate to suit the Log under operation. The output for hard-wood logs may average from 20 to 50 feet, and for soft wood logs from 40 to 80 feet sawing per minute.

Facility of operation is an important factor in Log-Sawing under present day requirements, when working expenses must be cut down as low as possible. This type of machine simply lends itself for easy operation.

Dimensions.

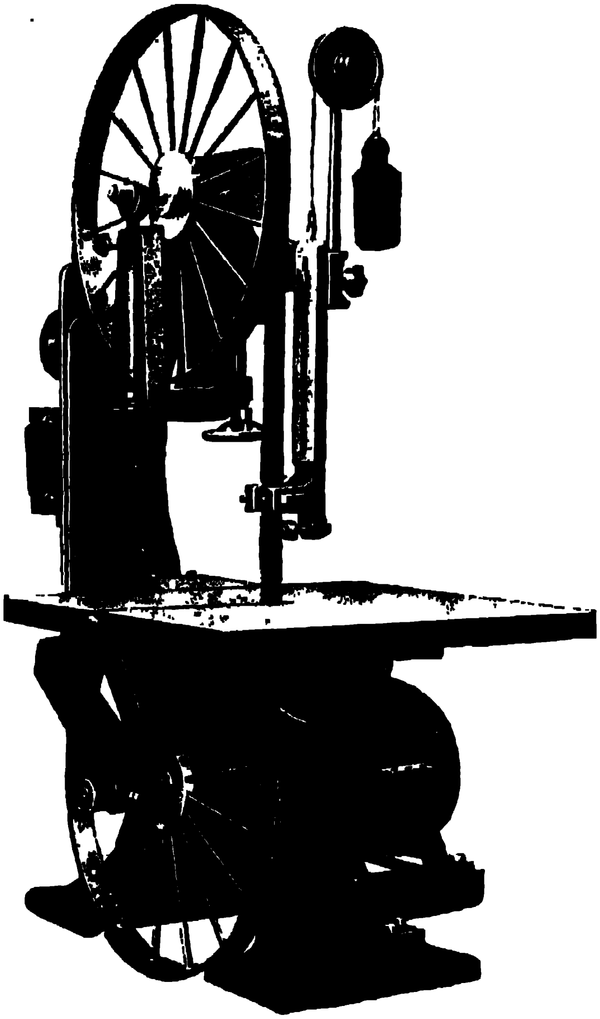
No.	Size of Saw Pulleys.	Width of Saw	Size of Log.	Size of Driving Pulley.	R.P.M.	Approx. Weight.	Approx. B.H.P.	Pri· R
1	54 ins.	5 ins.	36 ins. sq. or 48 ins. dia. × 30 ft. long	24 × 8 ins.	500	10 tons	35	24,3 0
2	60 ,,	6 ,,	48 ,, 60 ,, × 30 ,,	30 × 8 ,,	450	12 ,,	40	27,3 0
3	66 ,,	7 ,,	60 ,, 72 ,, × 30 ,,	36 × 10 ,,	400	14 ,,	50	42,5 0

Particulars and prices of other types on application.

High-Speed Bandsawing Machine.

With Outside Bearings, Belt or Motor Driven.

NC.



Of latest design and construction. Main Frame of strong cored type. Table of large size, arranged to cant, and with extension over lower Saw Pulley. The Saw Pulleys are of special light construction, and arranged to run in double Ball or Roller Bearings. An improved Cant arrangement is provided for the Top Saw Pulley, also sensitive knife edge tension. Anti-friction Ball Bearing Saw Guides are fitted, the top one having balanced adjustment

The Machine may be made—

(1) With Fast and Loose Pulleys, Belt Guide, etc.

(2) With Electric Motor, direct driven by patent "V" Belt, Motor fixed to base of machine, Starter fixed to main Frame.

Dimensions.

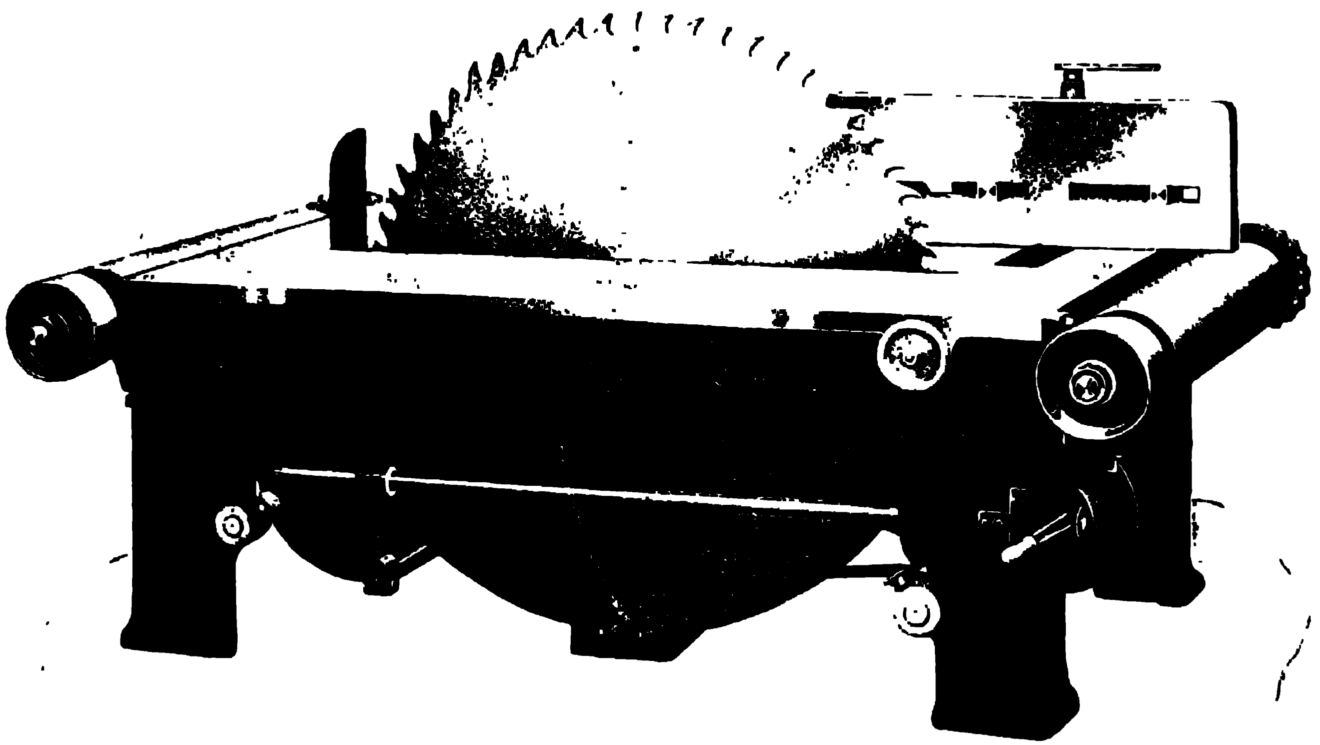
No.	Diam. of Saw Pulleys.	Depth of Cut.	Size of Pulleys.	R.P.M.	BELT DRIVEN.		MOTOR DRIVEN.	
					Approx. Weight.	Price.	Approx Weight.	Price.
						Rs.		
	36 ins.	20 ins.	12 ins. × 3½ ins.	500	18 cwts.	1,825	22 cwts.	Extra according to size and type of motor required.
	42 ,,	22 ,,	14 ,, × 4	420	24 ,,	2,500	28 ,,	
	48 ,,	24 ,,	16 ,, × 4	380	30 ,,	3,200	35 ,,	

Particulars and prices of other types on application.

Colonial Saw Bench with Continuous Feed.

For Sawing Medium Size Logs or Large Flitches into Sleepers, Scantling, Deals, etc. General Sawing or Crosscutting, for Heavy Work.

ML.



Saw Bench of very massive construction to deal with heavy work in sawing Colonial and Foreign hard woods. Continuous feed by large diameter horizontal rollers at each end of Bench, connected by endless chain, driven by powerful purchase gear, with three speeds and quick return or reversing motion. Strong Steel Saw-spindle runs in Ball or Roller Bearings and is fitted with Fast and Loose Pulleys, also Belt-guide adjustable Fence with quick or fine-screw advancing movement and locking gear.

Dimensions.

No	Bench	Diam. of Saw	Pulley	R.P.M.	Approx. B.H.P.	Approx. Weight.	Price
							Rs.
	5 ft × 3 ft 6 ins	42 ins.	12 ins × 7 ins	1,000	20	35 cwts	**3,040**
	3 „ 6 „	48 „	14 „ × 7 „	900	25	40 „	**3,345**
	3 „ 6 „	51 „	16 „ × 8 „	800	30	45 „	**3,650**
	3 „ 6 „	60 „	18 „ × 8 „	650	40	50 „	**3,950**

Particulars and prices of other types on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

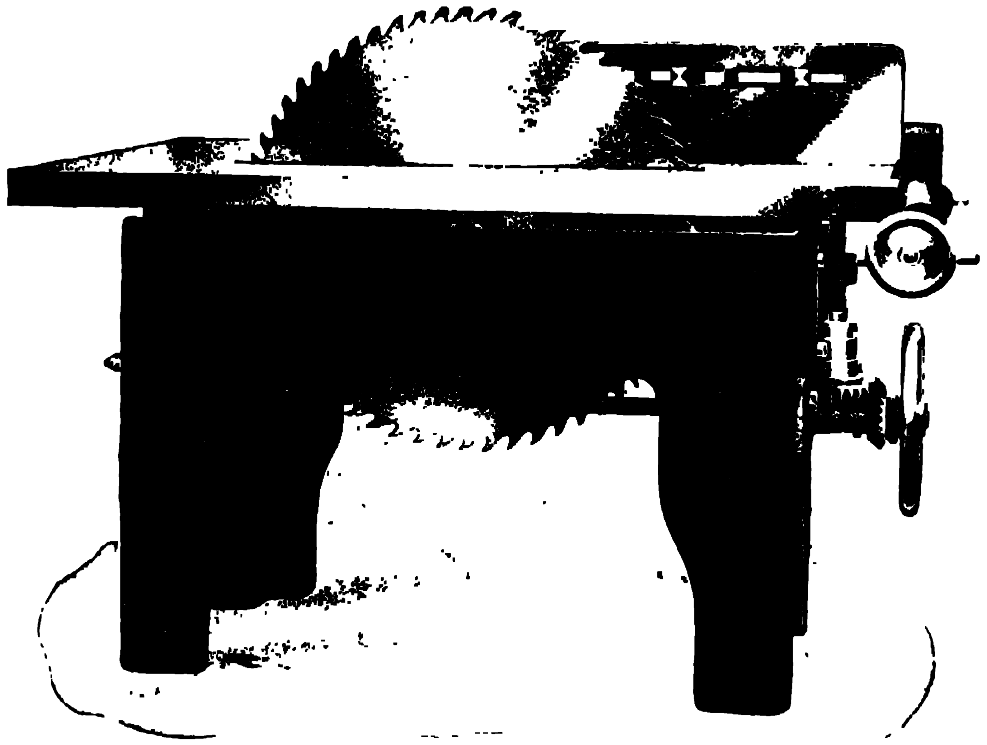
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

High-Class Circular Saw Bench with Rise and Fall Table.

For General Sawing and Crosscutting, also for Moulding, Tongueing, Grooving, Rebating, Tenoning, Mortising, Boring, etc. with Extra Appliances.

aMI.



The latest type of Rise and Fall Table Saw Bench, with massive main Frame cast in one piece, top and edges truly planed and polished. Saw Spindle of High Quality Steel, running in Patent Ball or Roller Bearings, Loose Pulley arranged separately from Saw Spindle to avoid contact when stopped for changing Saws, thus preventing accidents. Suitable Belt Guide provided. The Table is adjustable by large hand-wheel with screws and Bevel Gear to suit the depth of cut required. Fence of improved Advancing Bevelling and Turn-over type with all adjustments.

The Spindle end is arranged to carry either Saws or Cutter Blocks for the various operations

Dimensions.

Size of Table.	Diam. of Saw	Size of Pulleys.	R.P.M.	B.H.P.	Approx. Weight	Price.
4 ft. 6 ins. × 2 ft. 6 ins	30 ins.	9 ft × 4½ ins.	1400	10	15 cwts.	1,220
5 „ 0 „ × 2 „ 6 „	36 „	10 „ × 4½ „	1200	12½	20 „	1,445
6 „ 0 „ × 3 „ 0 „	42 „	12 „ × 5 „	1000		25 „	1,975

Extras.

Cutter Blocks for Moulding, Tongueing, etc., Moulding Cutters, Tongueing and Grooving Cutters, Rebating Cutters. Slide Plate for crosscutting and Groove planed in Table Top. Tenoning Apparatus with Fence and complete Slide Cramp. Boring Apparatus, or slot mortising and Boring Apparatus with compound sliding Table arranged to rise and fall. Self-feed Rip Gear for timber up to 6 ins. thick. Two speed countershaft.

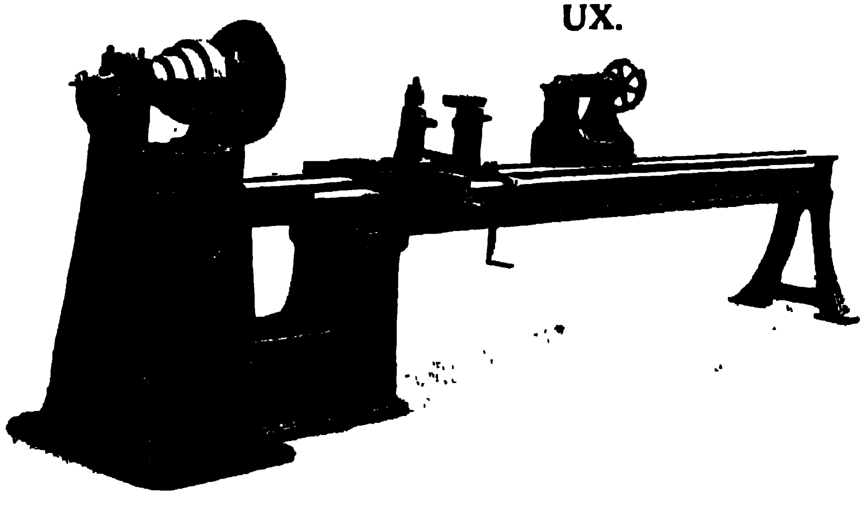
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Wood-Turning Lathes.

UX.



Heavy Type Gap Lathe.

For Wood Turning.

Specially designed for Pattern Shop work of the heavier type, and with Box Section Frame to support the Fast Head, Gap and Bed. Sliding Carriage and Tool-holder, with Rack and Pinion traverse; also adjustable Holders with T Rest for hand Turning One small and one large Face Plate Countershaft with 4-speed Cone, Fast and Loose Pulleys and Belt Guide.

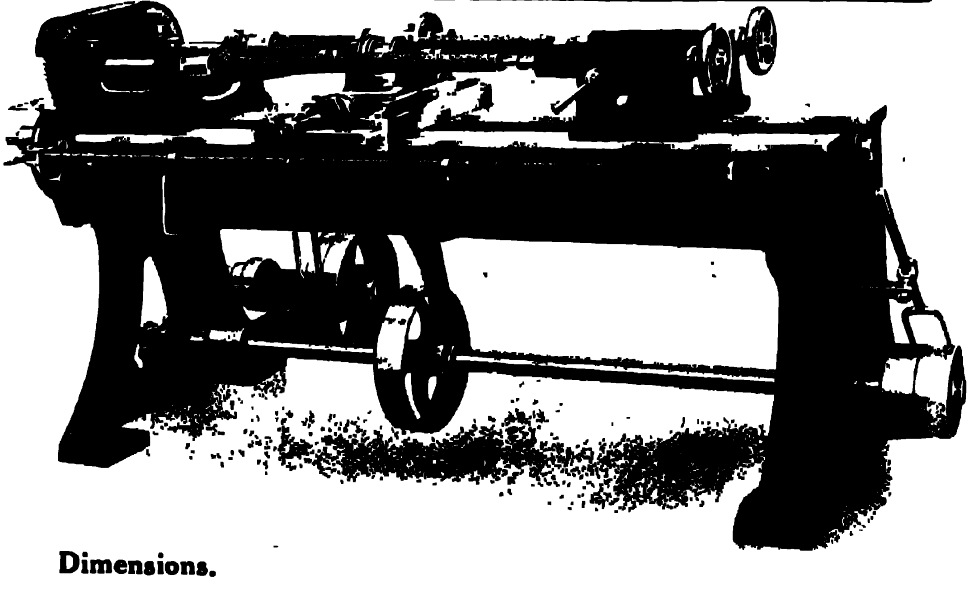
Dimensions.

No.	Sizes.		Admit in Gap.	Fast and Loose Pulleys	R.P.M.	B.H.P.	Approx. Weight.	Price.
	Centres	Length.						
1	12 ins	14 ft	60 ins. dia × 15 ins. wide	10 × 3	500	3	30 cwts.	**Rs. 3,190**
2	15 „	14 „	66 „ „ × 15 „ „	12 × 3	500	3½	32 „	**„ 3,800**
3	18 „	14 „	72 „ „ × 18 „ „	12 × 3½	500	4	35 „	**„ 4,560**

Single Spoke, etc., Copying Lathe.

UU.

An improved design for shaping Spokes, Handles, Gun Stocks, and similar work, of various lengths, in accordance with an iron dummy pattern It has self-acting variable feed and stop motion, also an adjustment which allows of the Spokes, etc, being made larger or smaller than the dummy pattern when required



Dimensions.

For work up to	Fast and Loose Pulleys	R.P.M.	Approx. Weight.	Price
24 ins.	6 ins × 3 in	1,000	16 cwts.	**Rs. 2,435**
42 „	8 „ × 3	800	20 „	**„ 3,650**

Spoke Tenoning arrangement extra.

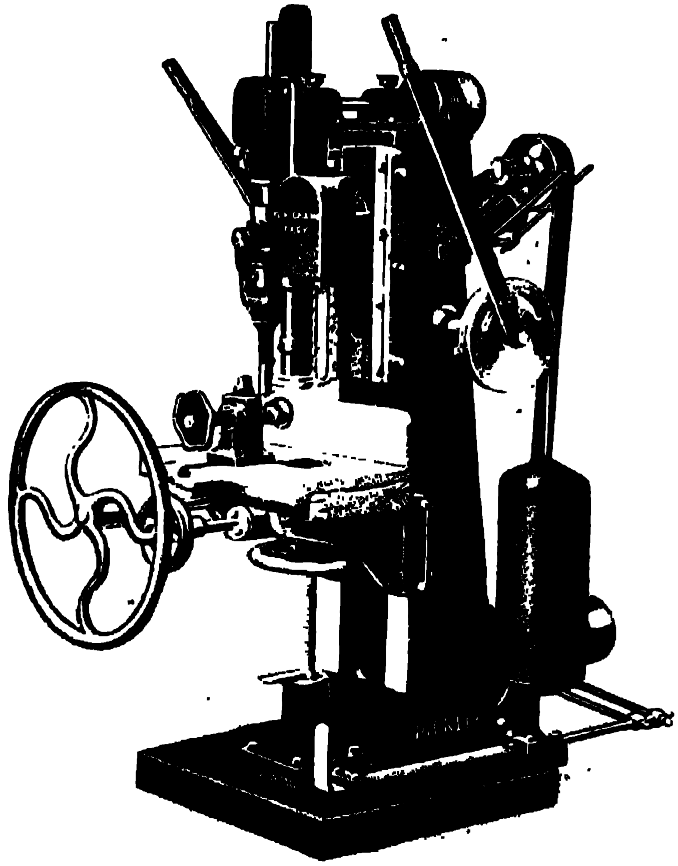
A similar Machine is also made to shape two objects at once.

Particulars on application.

Particulars and prices of other types on application.

Chain-Cutter and Hollow Chisel Mortiser and Borer.

QS.



For rapid Mortising in all Joinery, etc., work by the continuous action of a Chain-cutter, which, according to size, will make individual Mortises ¼ in. to 1¼ ins. wide by 1½ ins. to 3 ins. long (or larger sizes by repeated operation). Also Square Hollow Chisel with Auger for Mortise Holes ¼ in. to 1 in Cutting depth varies according to size of Chain or Chisel from 3 ins. to 6 ins.

The Machine is quite self-contained and well proportioned for easy operation in either light or heavy work. The Chain-cutter occupies the central portion of the machine for dealing expeditiously with the larger Mortises, and the Hollow Chisel placed in line with same is available for square holes or short mortises (by removing the square chisel may be used for ordinary boring).

The standard capacity for this size machine is usually timber up to 14 ins. deep by 8 ins wide.

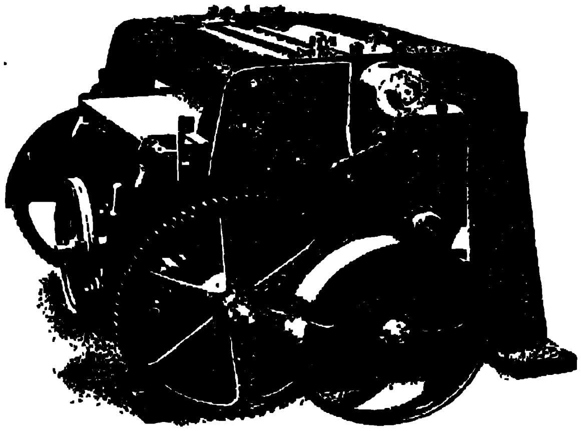
Dimensions.

Fast and Loose Pulleys.	R.P.M.	B.H.P	Approx Weight.	Price.
6 ins. × 3 ins.	1,000	3	15 cwts.	**Rs 2,280**

All Chains, Guide Bars, Sprockets or Hollow Chisels with Augers are extra.

Particulars and prices of other types on application.

Wood Planing Machines.



Single Type Planer.
JC.

Single Type Planing Machine JC made in all sizes to plane wood 24 ins to 60 ins wide by 7 ins. thick Main Frame in one massive casting; Solid Table with inclined slides with power friction rise; Front Sectional Feed Roll; Plain or Patent Spiral Cutter Spindle. Improved Concentric Pressure Bars; Patent Instantly Variable Friction Feed to 100 feet per minute

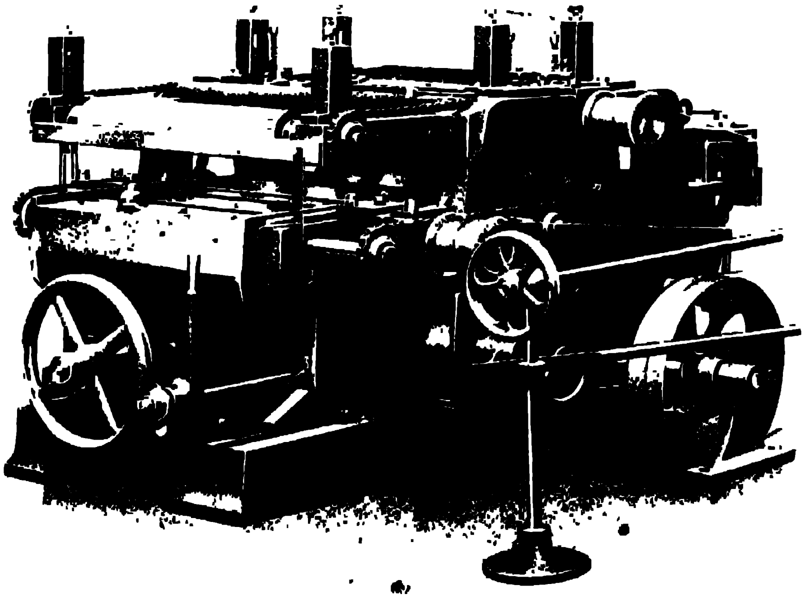
Dimensions.

No.	Size	Fast and Loose Pulleys.	R.P.M.	Approx. Weight.	Floor space. Width only	Solid Front Roll Price.	Sectional Front Roll. Extra.
	24 ins.	12 ins × 6 ins.	800		5 ft. 6 ins	Rs. 5,475	Rs. 365
	30 „	12 „ × 6 „	800		6 „	„ 6,385	„ 455
	36 „	12 „ × 6 „	800		6 „ 6 ins	„ 7,300	„ 545
	48 „	12 „ × 6 „	800		7 „ 6 „	„ 9,120	„ 730
	60 „	14 „ × 8 „	800		8 „ 6 „	„ 11,400	„ 910

Double Type Planer.
JD.

Double Type Planing Machine JD made in sizes to plane wood 24 ins to 60 ins. wide by 7 ins thick Main Frame in one massive casting Double Front Solid or Sectional Feed Rolls, Adjustable Front Table before Bottom Cutter Spindle, Plain or Patent Spiral Cutter Spindles One or two Side Cutter Spindles for Edging, Tongueing Grooving, etc.

One or two Side Cutter Spindles for Edging, Tongueing, Grooving may be fitted to any size JC or JD. Machines at an additional cost



Dimensions.

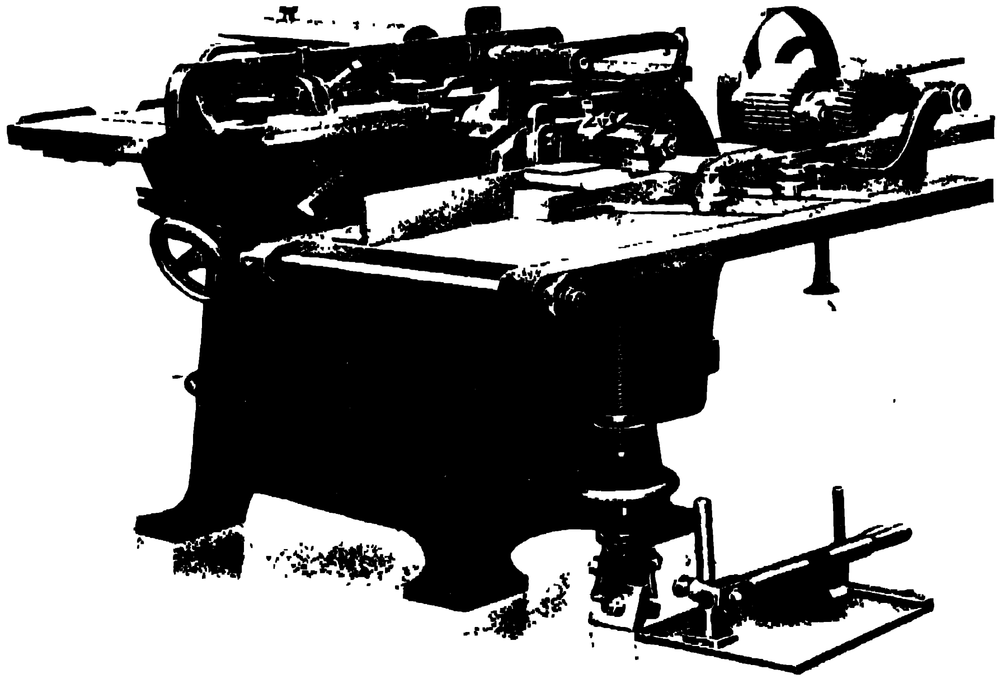
No.	Size	Fast and Loose Pulleys	R.P.M.	Approx. Weight	Floor Space. Width only.	Solid Front Rolls. Price.	Sectional Front Rolls Extra.
	24 ins	12 ins × 8 ins.	800	3 tons.	5 ft. 6 ins.	Rs. 8,210	Rs. 730
	30 „	12 „ × 8 „	800	3¼ „	6 „	„ 9,575	910
	36 „	12 „ × 8 „	800	3½ „	6 „ 6 ins.	„ 10,945	1,090
	48 „	14 „ × 8 „	800	4 „	7 „ 6 „	„ 13,680	1,460
	60 „	14 „ × 8 „	800	4½ „	8 „ 6 „	„ 17,100	1,820

Particulars and prices of other types on application.

Universal Variety Woodworker.

For Hand-Feed Sawing, Surfacing and Jointing, Tenoning, Slot Mortising and Boring, also Power-Feed Planing and Moulding, etc.

JMOY.



A most useful and handy Machine for most woodworking operations, and will considerably reduce labour costs in large as well as small establishments. Machine may be worked by one man or as many as three men all doing different work, such as Sawing, Planing and Mortising, whilst very quick changes can be made for moulding (straight), Tenoning, Tongueing, Grooving, etc. The Machine is always available for Surfacing, Rebating, Chamfering, Stop Chamfering, Beading, Boring, etc.

Capacities.—To carry 15 ins. or 24 ins. diameter Saw, to Plane 12 ins. wide, to Mould 5 ins. wide, and to Mortise and Bore up to 12 ins. by 6 ins. Timber.

For **Sawing,** etc., a suitable adjusting turnover and canting Face is supplied, also Groove and Sliding Plate for Crosscutting.

For **Planing** and **Moulding,** a self-acting Power Feed is provided, which, though light and portable, will be found of immense utility in producing all such suitable moulds as are ordinarily required for Joinery Work; a Fence, also Down and Side Pressure being provided.

For **Tenoning,** Special Cutter Blocks are supplied to cut Tenons 5 ins. long, the Timber being carried on a sliding cramp. Tenons may be worked either above or under the Spindle as desired.

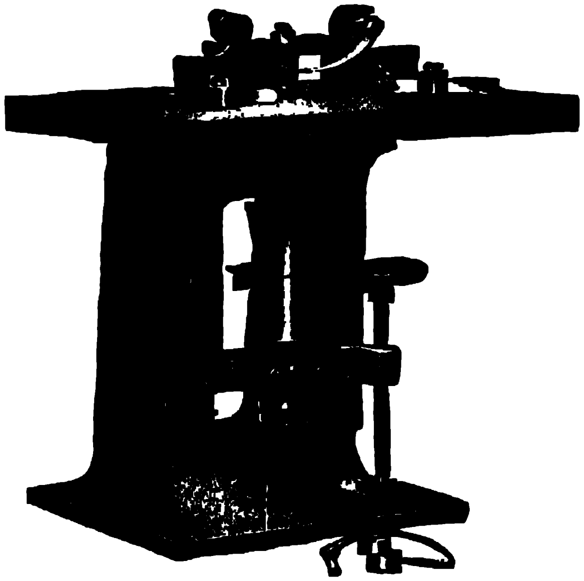
For **Boring** one end of Spindle is fitted to receive Bits or Augers, and an adjustable hand-feed slide carries the timber; but for **Slot Mortising** a Compound Slide is supplied and operated by Handles or Levers. Countershaft, with fast and loose Pulleys and Belt Guide included. Size of Pulleys 8 ins. by 4 ins.; R.P.M. 800.

Price **Rs. 3,800**

Particulars and prices of other types on application.

Single Spindle Circular Moulding Machine.

W2.



Improved design for working straight, irregular or circular Mouldings for all Joinery or Cabinet work, particularly useful for making small quantities of special shape Mouldings when required, also for edge Moulding, Rebating, Jointing, etc. Main Frame of strong section carrying truly planed and polished Table, also Moulding Spindle mounted in bearings on a Bracket Slide adjustable vertically by hand-wheel Moulding Spindle will run in either direction to suit nature and grain of the wood, and being adjustable vertically quickly sets the Cutters to required height above table

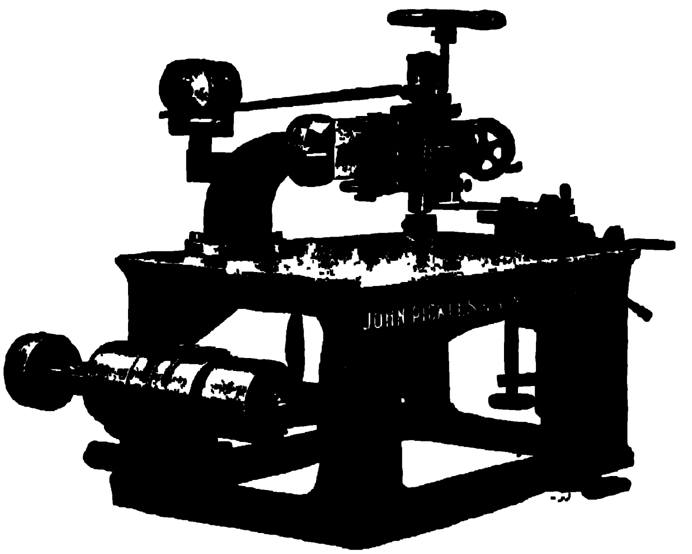
No	Size of Timber.	Size of Table.	Size of Counter-shaft Pulleys.	R.P.M.	Approx. Weight.	Approx. B.H.P.	Price
	To ins.	ins	ins		cwts.		Rs.
1	4 deep	24×24	6×3	1,000	10	2½	1,140
2	6 „	30×30	6×3	1,200	15	4	1,370

Universal Circular Moulding Machine with Trenching Apparatus.

WW.

A combination of Upper and Lower Vertical Spindles for working straight, circular or irregular Mouldings, such as in Sash Bars and Frames, Circular or Twisted Hand-rails or Mouldings of any shape, Table Edges, Raised Door Panels, Recessed Mouldings, Trenching, Housing for Stair Treads, Chamfering, Rebating, Tongueing, Grooving, all kinds of Tracery, etc., work, by using suitable Templets and Cutters. It is also specially adapted for Engineers' Pattern Shops for making Patterns, Core Boxes, etc., and is a great labour saver.

Size Tab	Fast and Loose Pulleys	R.P.M	pprox eight	H.	Price
ft.	ins.		tons.		Rs.
5×3	9×3	1,300	1½		3,195



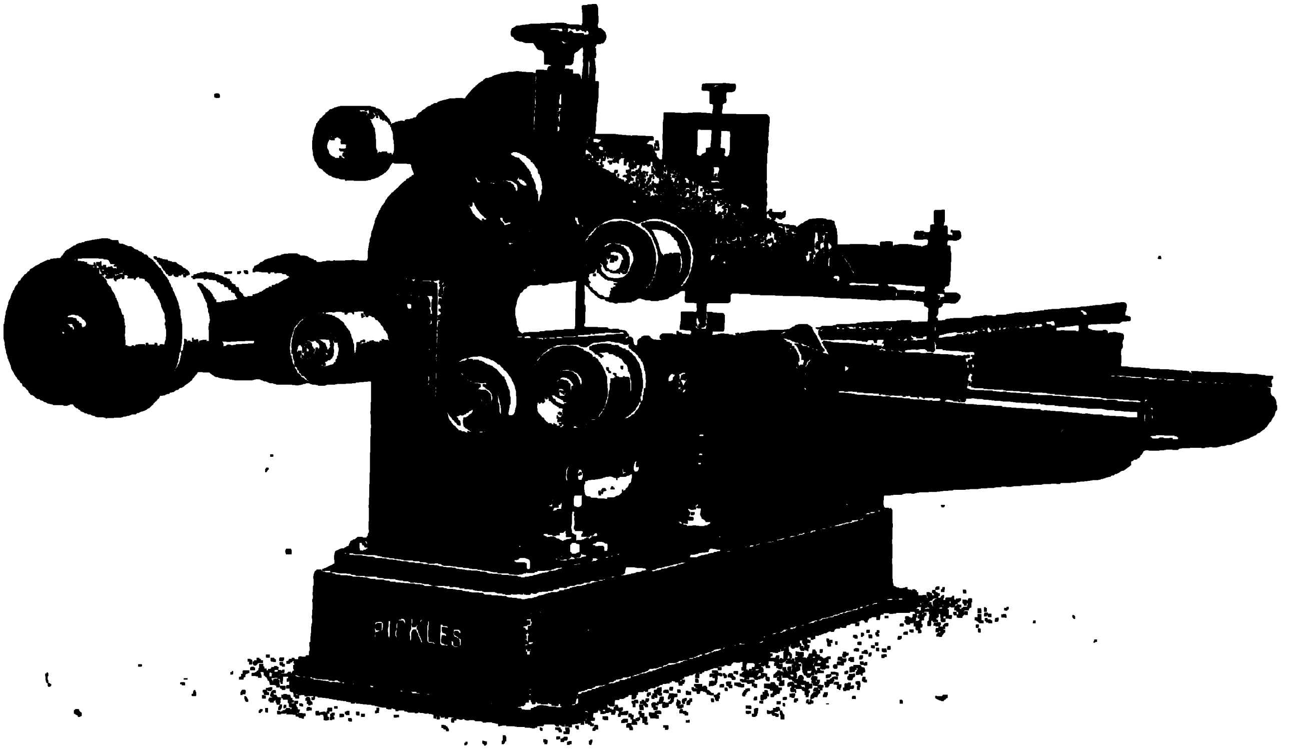
Particulars and prices of other types on application.

Tenoning Machines.

For Single or Double Tenons, Scribing, Trenching and Crosscutting.

For Cutting Tenons required in Doors, Sash or Window Frames, Cabinet Work, Railway Carriage Windows, Doors; also heavier types for Contractors' Work, Railway Carriage Shops.

Type O.



Two horizontal Cutter Blocks are provided of the size specified for length of Tenon, and adjustable for thickness required, also for equal or unequal length Tenons.

Vertical spindle is also employed to carry Cutter Disc, Grooving or Wobble Saw, adjustable to size required, also a Cutter Block for Scribing cutters to shape the shoulders to fit moulded sash, etc., a Top Vertical Scribing Spindle being also required for shaping the top shoulder.

Types O and OB are suitable for Trenching wood up to width specified by using single or expanding Trenching Heads ½ in. to 2 ins. size on the top horizontal spindle, clear space being left to pass long lengths through the machine, or a Crosscut Saw with collars may be similarly employed to make the machine serve for Crosscutting long or short lengths, and thus increasing its utility when not fully engaged on Tenoning work.

The Sliding Table for each machine is of special construction with Roller or Ball slideways, carries an adjustable Setting Out Bar and Stop, also efficient Cramping Device.

Dimensions.

Type.	Length of Tenon.	Size of Timber.		Fast and Loose Pulleys.	R.P.M.	B.H.P	Approx Weight	Single Tenons only Price.	Double Tenon with Bottom Vertical Spindle Price.	Double Tenon and Scribing with Top and Bottom Vertical Spindles Price
		Width.	Thickness.					Rs.	Rs.	Rs.
O1	3 ins.	6 ins. ×	3 ins.	6 ins. × 3 ins.	900	2½	10 cwts.	1,520	1,825	3,200
OB	5 "	15 " ×	4 "	8 " × 3½ "	900	5	22 "	2,280	2,735	3,800
O	6 "	20 " ×	6 "	9 " × 4 "	750	6	30 "	2,735	3,200	
OA	8 "	24 " ×	8 "	12 " × 6 "	625	10	45 "	3,650	4,560	

Particulars and prices of other types on application.

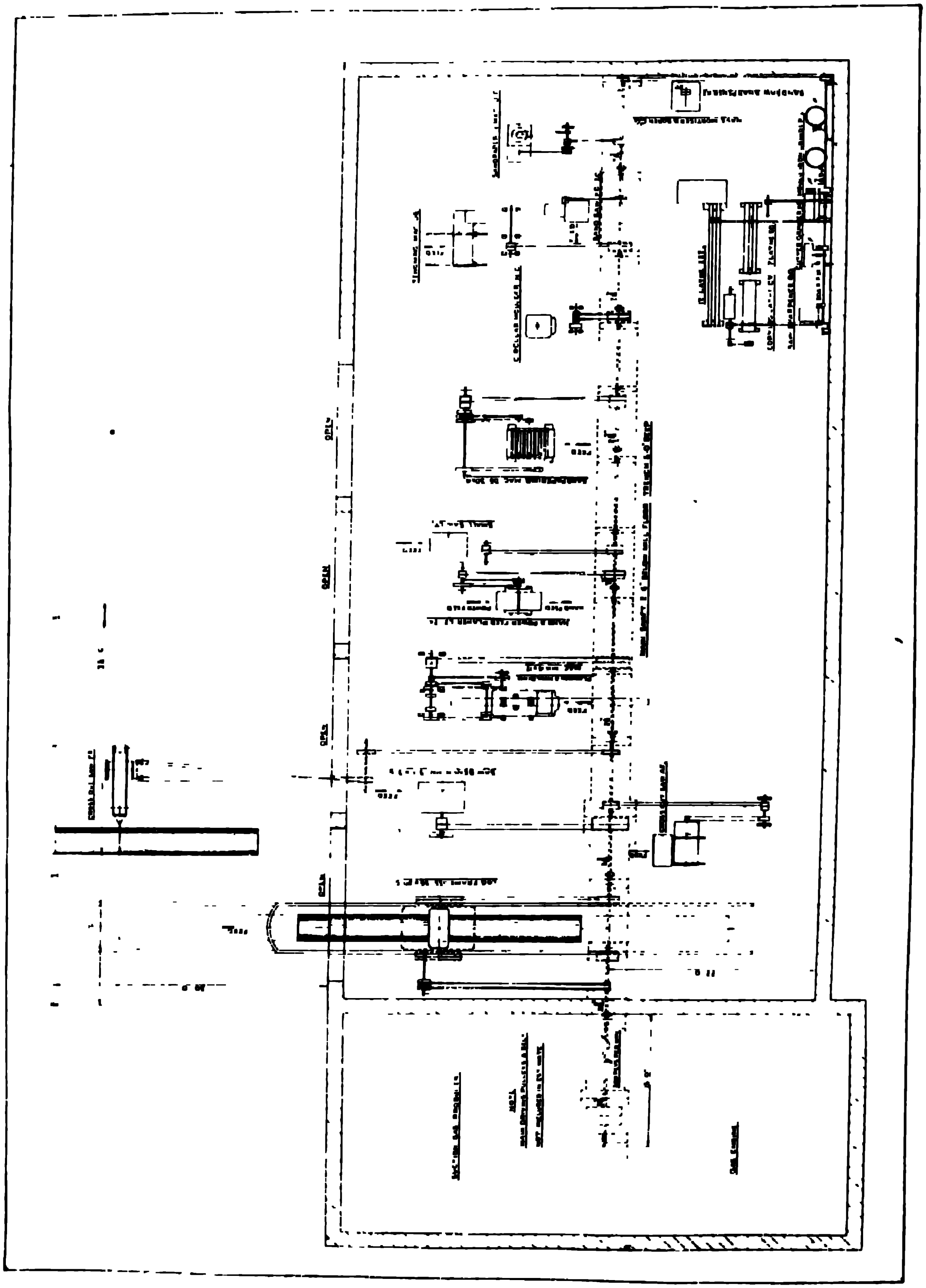
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Typical Layout.

For Wood-working Shop.



We illustrate above a typical layout of a wood-working factory with machines for handling full size logs, sawing of the same, and converting to articles such as window and door frames, furniture, etc.

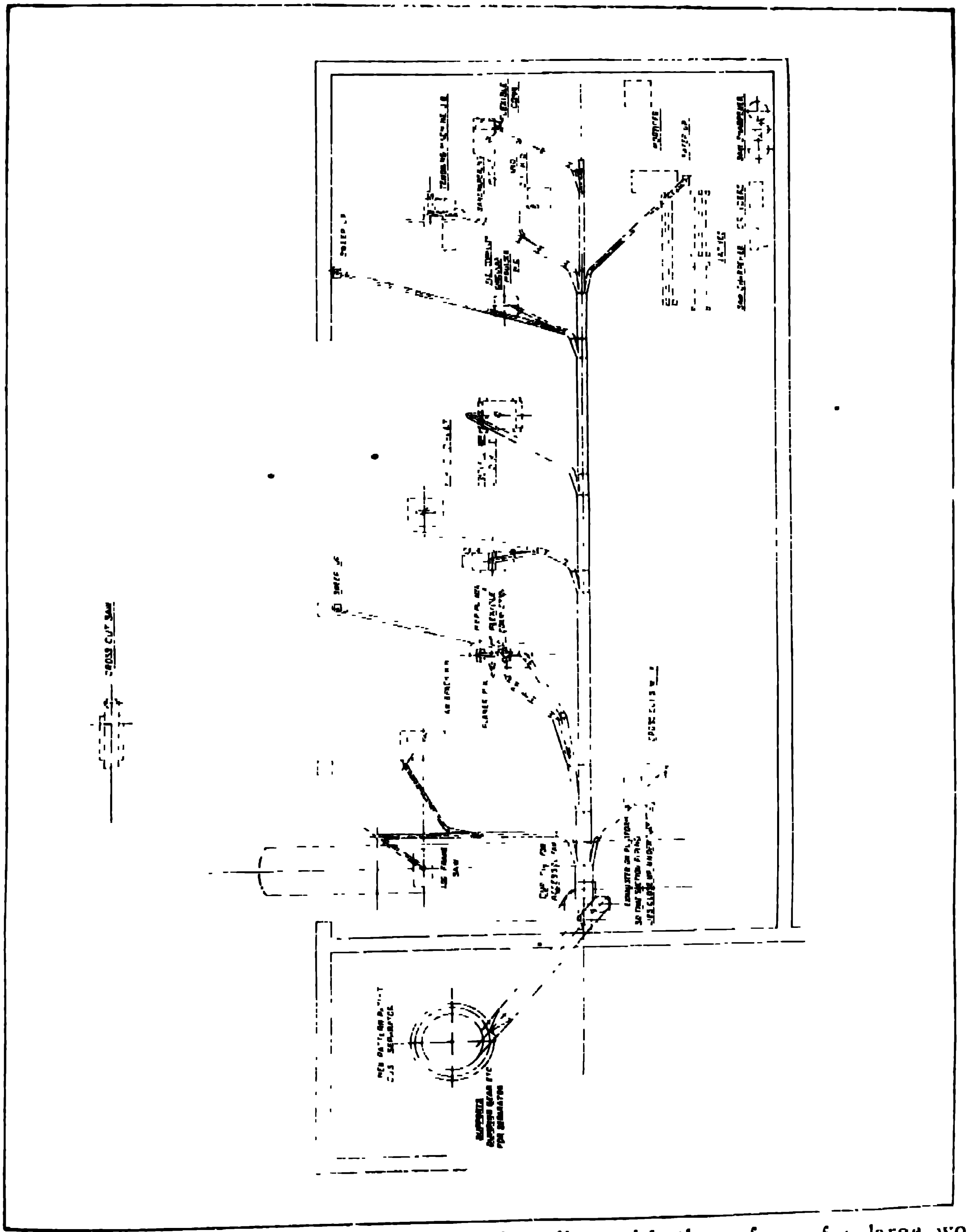
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Typical Layout.

For Wood-working Shop.



The above illustration shows a method of dealing with the refuse of a large wood-working factory and saw mill by means of a system of trunking which, in conjunction with an exhaust fan, conveys the saw dust, chips and waste blocks from the machines to the boiler house or gas producer where they are utilised as fuel.

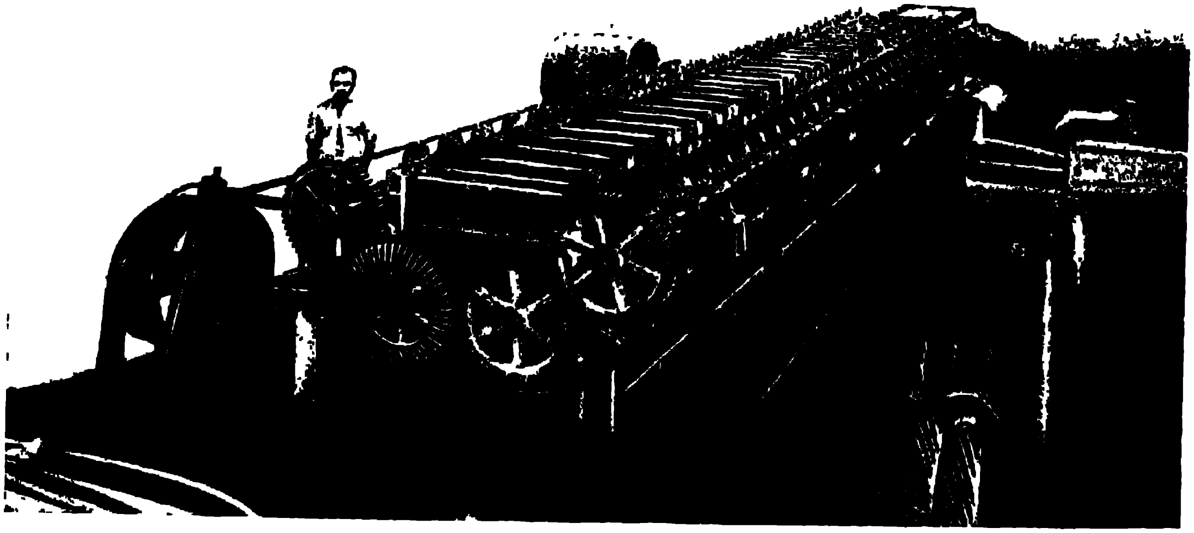
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Textile Machinery.

A. Jute Softener.



Jute Softener in course of erection.

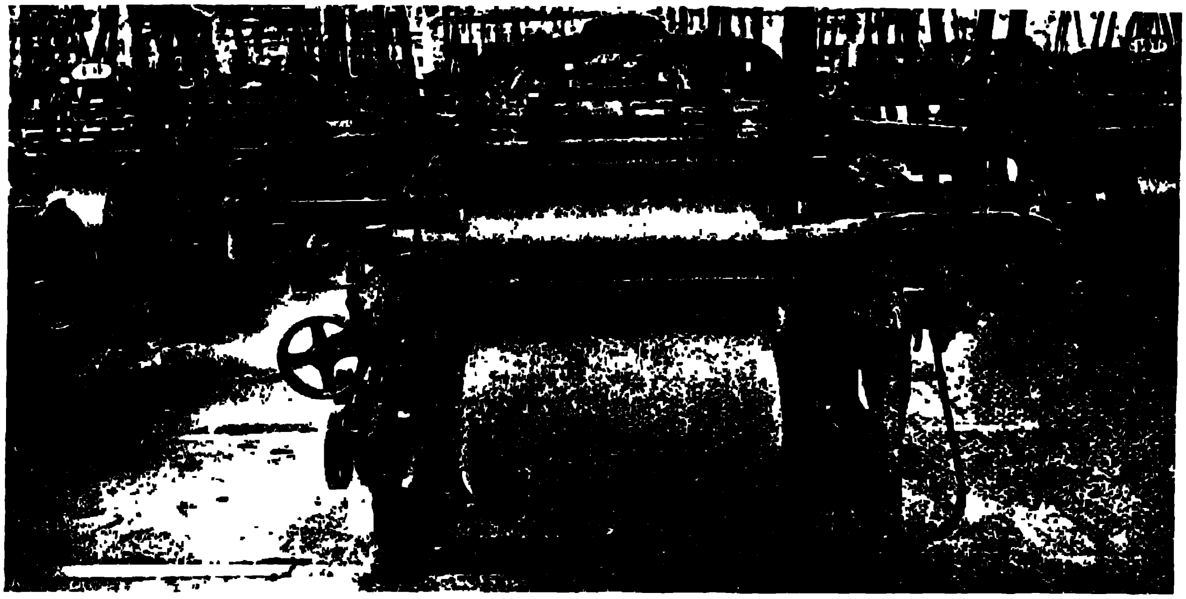
During the War and since, we have manufactured many types of textile machines for local and up-country mills. Our products have given every satisfaction, and results under working conditions alongside imported machines have been very favourable.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

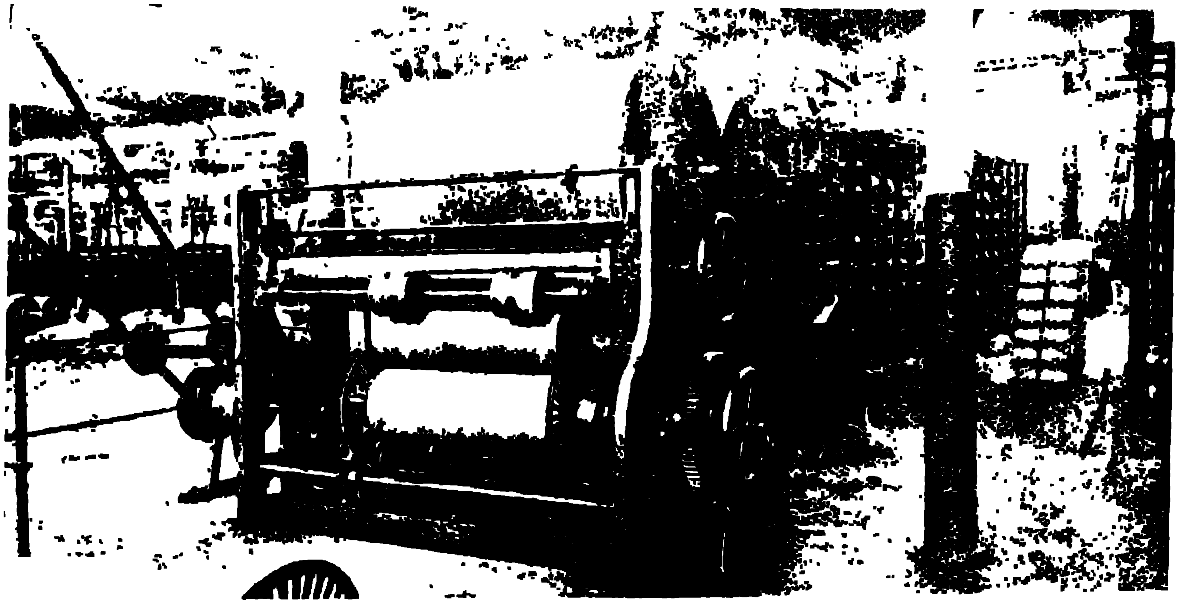
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Textile Machinery.



A 46½-Reed Hessian Loom.



A Single Yarn Dressing Machine.

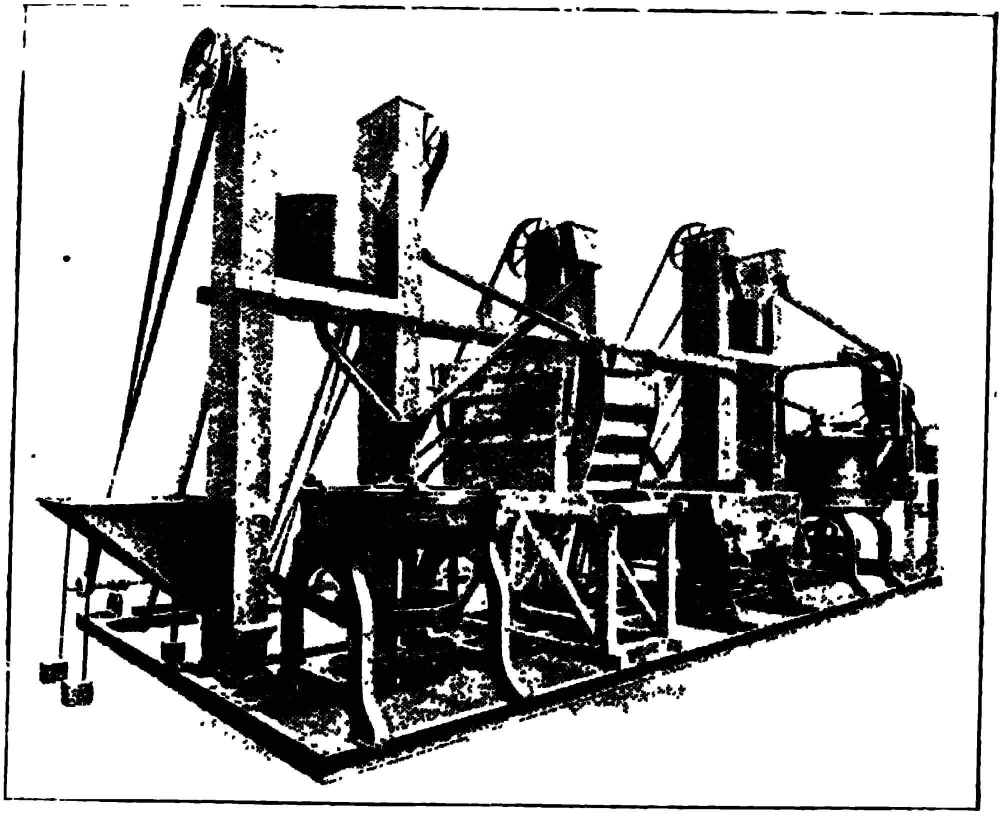
Many of our constituents are unaware that with Indian labour it is possible, given expert supervision, to manufacture textile machinery. We trust that the illustrations on this and the previous page are convincing.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Rice Milling Machinery.



As Agents for Messrs. Henry Simon Limited, Manchester, we are in an exceptional position to supply Rice Milling Machinery of the latest designs for the production of White Rice. We maintain a staff of expert engineers and undertake the complete erection of Rice Mill Machinery and Buildings.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Simon" Self-Contained Rice Mills.

A Self-Contained Rice Mill, in order to be a commercial success, must be:—

(1) Low in first cost.
(2) Easily and cheaply erected.
(3) Easily and cheaply run.
(4) Capable of giving the most rice of high market value from the paddy fed.

Our Self-Contained Mills embody these essential features and have been designed to meet the requirements of up-country millers in every respect.

"Simon" Mills the Cheapest.—We maintain that if cost "Erected and Running" is considered the "Simon" Self-Contained Mill is the cheapest on the market. It may be possible to purchase cheaper machinery but when extra cost of foundations, cost of erection and material required for erection is taken into account the "Simon" plant will be found to be the cheaper.

Light Foundations. Easily Erected.—Self-Contained Mills require only a simple and light foundation. They are easily and cheaply erected and started up because they are well designed, and have already been erected and tested in the maker's works; all parts are clearly marked, and full erecting instructions are sent with each plant so that they can be erected by semi-skilled workmen in a few days.

Low Running Cost.—More important than first cost is the running cost which goes on from day to day and from year to year. This is always high when the plant is badly designed; when machines are placed where they cannot be attended to in comfort; when runs are badly arranged; when bearings are small and belts too narrow. With such plants extra men are required, the wear and tear and cost of renewals is high, and often the whole milling hire is swallowed up. "Simon" Self-Contained Mills are designed by experts who have had many years' rice-milling experience in the East.

Small Staff Required.—The Mills are so arranged that a man can, without difficulty, see every machine, walk round it in comfort, and make any required adjustment while standing on either the ground floor or the platform. No climbing on or under running machines.

The Best Possible "Outturn."—The most important thing about a rice mill is that it should give a good Outturn—the highest possible percentage of whole rice with a clean white appearance from the paddy milled.

It is impossible for us to guarantee any fixed percentage because the paddy milled varies so much, but we know from experience that "Simon" Self-Contained Mills give results superior to those obtainable by similar plants of other makes.

Perfect Arrangement and Balance.—The superiority of the "Simon" Plants is due to the care taken to arrange them in the best possible way; to balance all moving parts and provide ample separating power, ample winnowing power, easy and accurate means for adjustment and thorough ventilation and removal of dust.

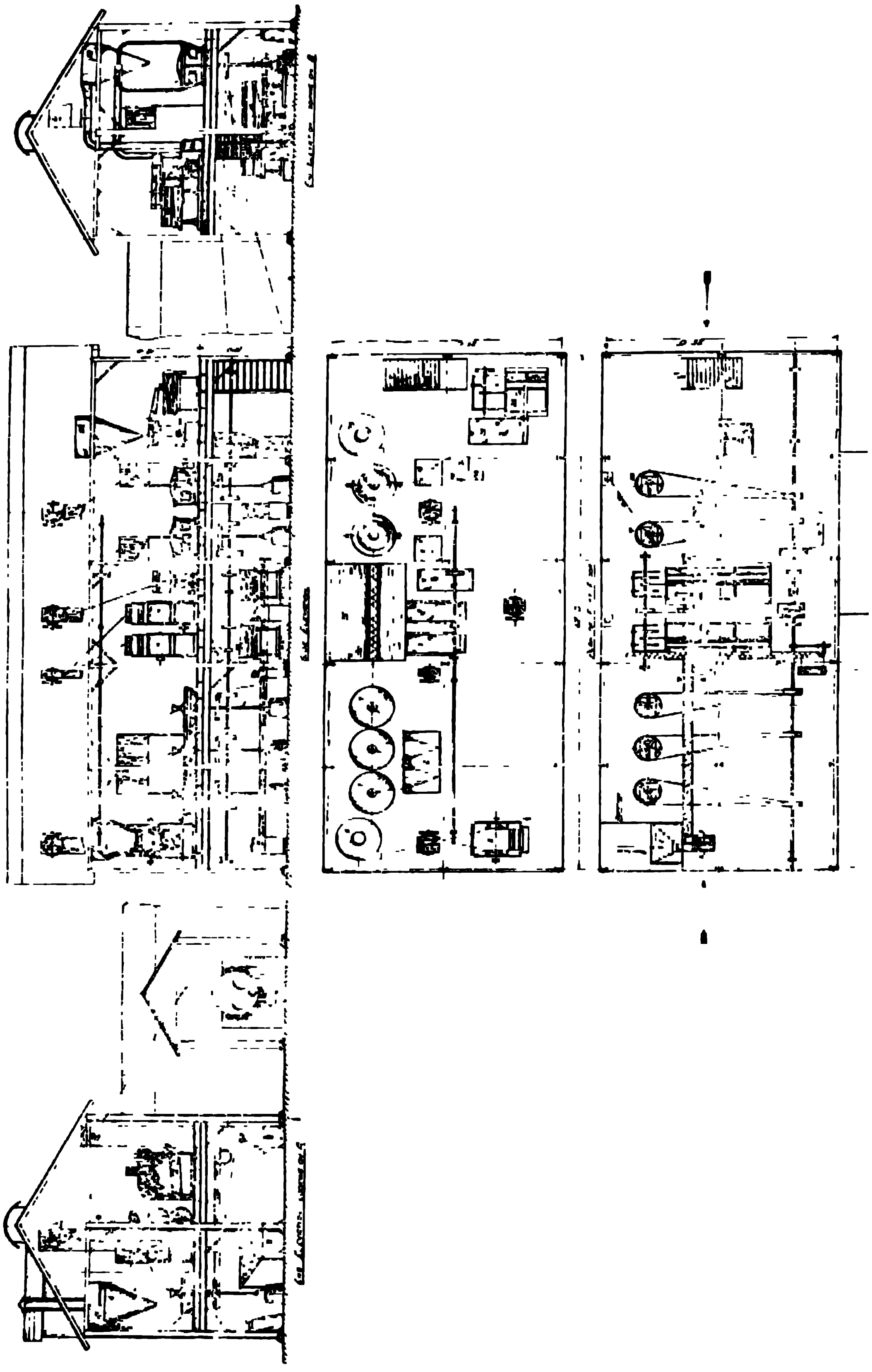
The illustration overleaf shows a "Simon" Self-Contained Rice Mill, supplied to a client in Burma, to turn out ¾ ton of rice per hour. It consists of the following:—

1 Elevator for the raw paddy.
1 Paddy cleaning machine.
1 Elevator for cleaned paddy.
1 Large bin for paddy.
1 Sheller, 40 ins. diameter.
1 Elevator for rice and husk.
1 Riddle for cargo rice.
1 Aspirator.
1 Paddy Eliminator—24 compartments.
1 Bin for shelled rice.
1 Cone mill, 30 ins. diameter.
1 Elevator for white rice.
1 Aspirator for white rice.
1 Rotary separator for white rice.
1 Suction fan.

All the necessary pipes and spouts.
A strong steel frame with timber floor, 7 ft. high.
All necessary shafting, pulleys, bearings, etc.
All elevator buckets, belts, timber, trucks, etc.

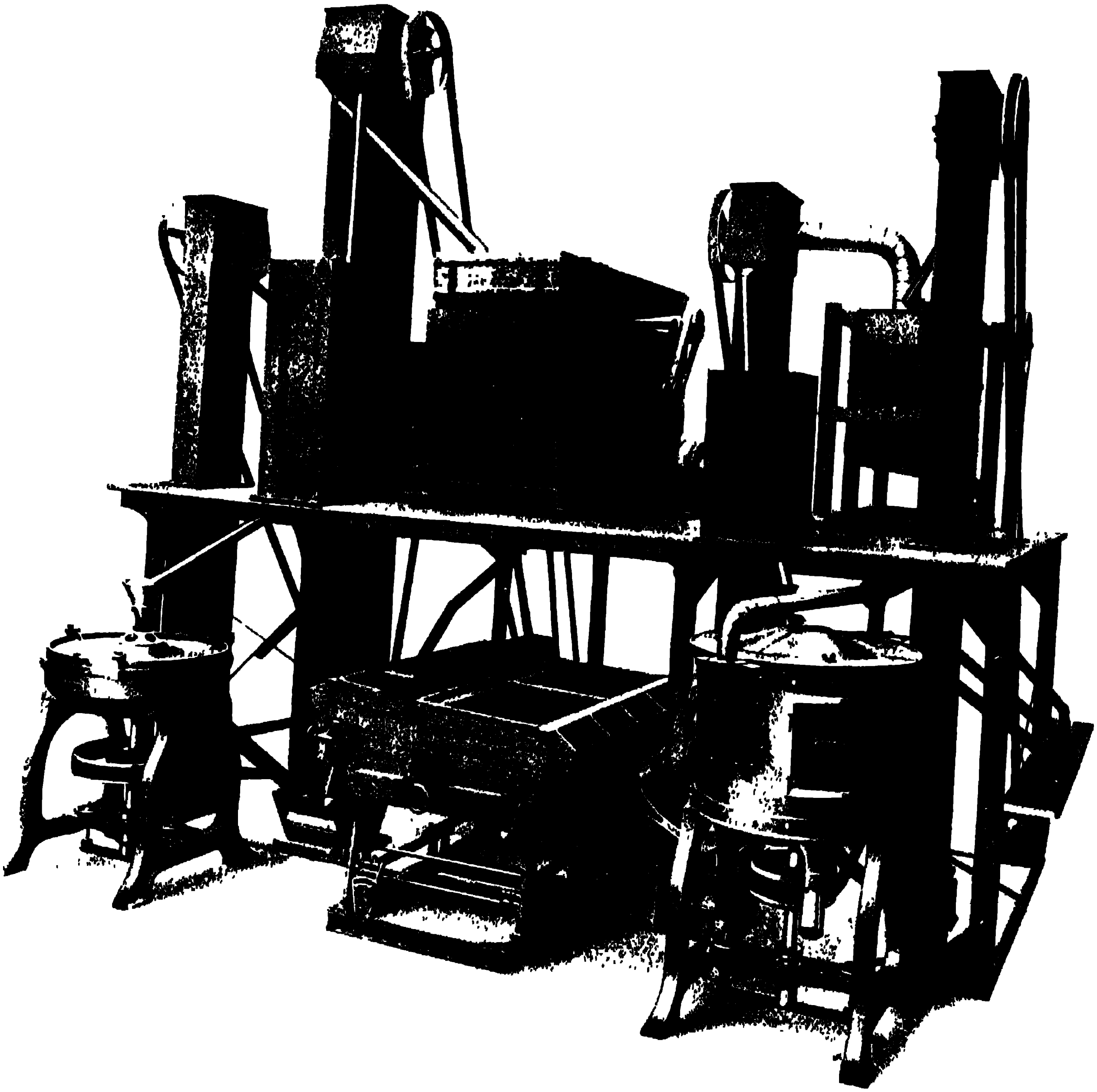
We have other standard designs and sizes of Self-Contained Mills ranging in capacity from ½ ton to 2¼ tons of rice per hour.

Full particulars will be given to all enquirers on application.



Genera Arrangemen of Detached Rice

For an outpu 2 to 3 ons per hou



"Simon" Self-Contained Rice Mill.

Sole Agents:

JESSOP & CO., LD.,

INDIA AND BURMA.

[To face page 690]

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Simon" Detached Mills.

We apply this term to mills having capacities up to five tons of cleaned rice per hour to distinguish them from mills of the same capacity but of the self-contained type.

Detached Type Mills are designed on the same lines and with as much care as the largest plants, and we recommend them in preference to self-contained mills wherever suitable labour is available for erecting and assembling.

We have standard designs for plants of this class, and particulars of these are given below, but departures from the standard specifications to meet clients' special requirements or exceptional local conditions can be made when required.

Capacities and Dimensions.

Capacity, White Rice per hour.	Space Occupied by Mill Building						Approximate Shipping		Price, exclusive of Belting & Cyclones Rs.
	Length		Width		Height.		Weight.	Measurement	
Tons.	Ft	Ins	Ft	Ins.	Ft	Ins	Tons.	Cubic Ft	
1	36	0	26	0	22	0	14 33	1,500	**26,190**
1½ to 2	36	6	26	0	22	0	17 20	1,800	**29,230**
2 „ 3	46	0	30	0	23	0	25 90	2,400	**40,550**
4 „ 5	51	0	28	0	32	0	40 80	3,500	**59,140**

We are at all times prepared to quote for suitable Power Plants, Steam, Oil, or Electric, to drive mills, and for suitable Steel Frame Buildings to house them.

To Enquirers.

It will help us to submit a useful tender for the plant you require if you send us full information regarding your needs, particularly on the following points:—

(1) **The amount of Grain** to be dealt with in tons, per hour or per day of a stated number of hours.

(2) **The sort of Grain** to be dealt with, whether Paddy, Cargo Rice, Shelled Rice, or Partly-milled White Rice. Wherever possible, a small sample should be sent.

(3) **The nature of the Finished Products required.**—This should be stated clearly, and when finished white rice is required the number and nature of the grades of broken rice must be given. Samples of *all* finished products required should be sent us to ensure a satisfactory tender.

(4) **The District** in which the plant is required to work.

N.B.—This information is extremely important, and should *never* be omitted.

(5) **Power Plant.** If you wish us to quote for Power Plant, state what power you require, and whether Steam, Gas, Oil, Electric, or Water Power. If either Electric or Water Motors are required, give full particulars of the supply available.

If the proposed plant is to be run by existing power plant, give particulars and a sketch showing the arrangement.

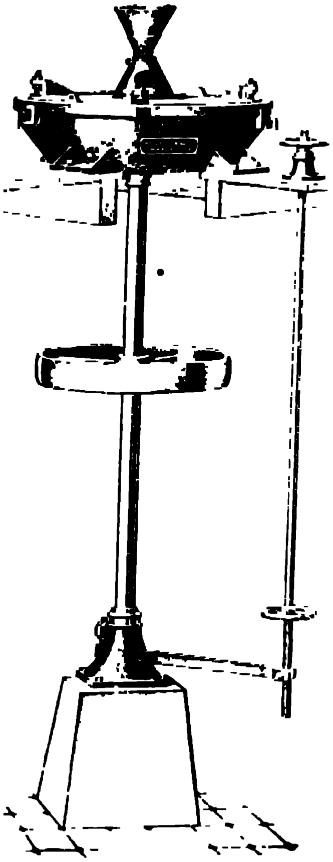
(6) **Buildings.**—If the proposed plant or machine is to be accommodated in existing buildings, or to work in conjunction with existing machinery, send full information, preferably a drawing showing existing buildings and/or machinery. This drawing need not be elaborate, but should be accurate and give all important dimensions.

If New Buildings are required, we are prepared to tender for the necessary materials for these, in any desired construction, on receipt of full particulars as to site, etc.

(7) **Fuel.**—In all cases where Power Plant is required state the nature of the fuel to be used. In most mills where paddy or raw grain is dealt with we recommend Steam Power, as the husks from the rice afford a convenient and economical fuel. We supply special furnaces for dealing with this fuel, and quote for these when requested.

"Reform" Rice Huller or Sheller.

For Mounting on Purchasers' Framework.



Design.—For all arrangements these machines are made strong and durable without excessive weight.

All parts are easily accessible, and the whole machine is arranged to work without creating dust.

Outlets.—The position of outlets for the shelled grain and husk can be arranged to suit requirements, but in all cases openings are made of sufficient area and designed so as to eliminate all risk of choking

Bearings.—These are very carefully designed and constructed. The neck bush has specially large bearing surfaces of anti-friction metal. The footstep runs in a ball-thrust bearing working in an oil-bath.

Feed.—This is adjustable by means of a screwed hopper discharging against a revolving cone of special hard iron. It is not readily choked by straws, etc., and ensures an equal distribution of feed.

Emery composition covering on the discs is not included, as this is usually applied at site, but when requested we will cover discs with a suitable composition or supply the necessary materials at an extra charge.

Capacities and Dimensions.

Ref. No.	Diam. of Disc.	Capacity per hour.	Space Occupied. Length		Width		Height.	Pulley. Dia. Width.	Speed.	Power Requir-ed.	Approx. Shipping Weight	Measurement.	Price.
	Ins.	Lbs.	Ft.	Ins.	Ft.	Ins.	Ft. Ins.	Ins. Ins.	R.P.M.	H.P.	Tons.	Cubic ft.	Rs.
2	30	1,120	3	6	3	6	To suit Requirements.	20×5	320	2·0	0·75	45	1,165
3	40	2,000	4	6	4	6		30×6	225	2·5	1·50	60	1,320
4	50	2,600	5	3	5	3		36×6	180	3·8	1·75	70	1,760
4a	54	2,800	5	6	5	6		36×6	170	4·0	1·90	80	1,825

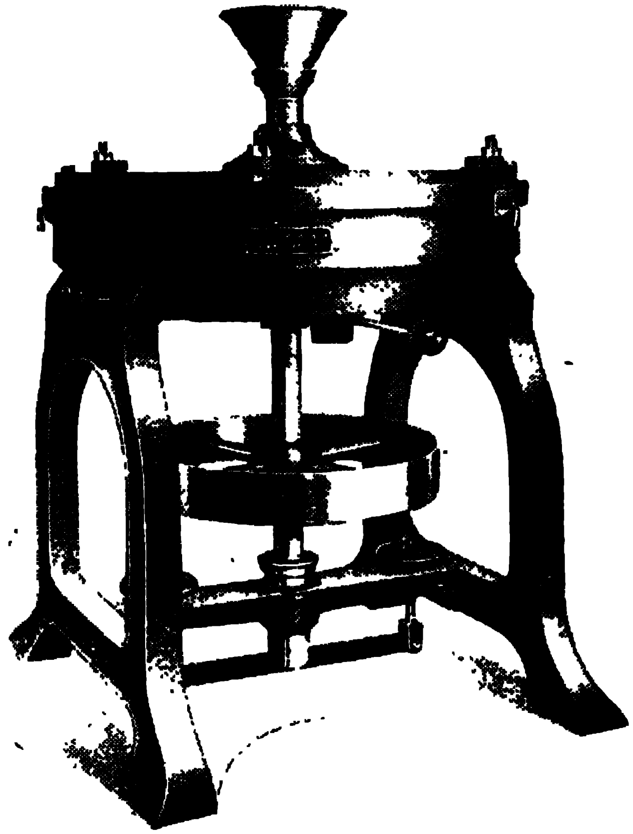
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Reform" Rice Huller or Sheller.

On Side Frames.



These machines are used for removing the shell or husk from the rice grain. They are of the under-runner type which experience has proved to be the best for this class of work.

The Discs. The upper disc is mounted in a strong cast-iron casing made dust-tight, and is adjustable. The lower disc is carried on the vertical spindle and revolves inside the casing.

Adjustment is effected by raising or lowering the spindle, suitable gear being provided for this purpose.

Arrangement. In these machines the discs, feeding gear and casing are standard, but various arrangements of under framing are made to suit purchasers' requirements.

All sizes up to 50 ins. diameter may be mounted on side frames to form a self-contained unit, as shown above or fixed to an upper floor with the footstep bearing carried on the floor below.

The larger sizes may be mounted in the same manner, but are preferably made to rest upon columns, as shown on the following page.

When specially requested, we can supply these machines arranged for driving by bevel gearing.

Capacities and Dimensions.

Ref. No.	Diam. of Disc.	Capacity per Hour.	Space Occupied.						Pulley.		Power Required.	Approx. Shipping		Price.
			Length.		Width.		Height.		Dia. by Wh.	Speed.		Weight.	Measurement.	
	Ins.	lbs.	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.	Ins. Ins.	R.P.M.	H.P.	Tons.	Cubic Ft.	Rs.
2	30	1,120	3	6	3	6	5	6	20 × 5	320	2·0	0·85	50	**1,275**
3	40	2,000	4	6	4	6	6	0	30 × 6	225	2·5	1·25	80	**1,640**
4	50	2,600	5	4	5	4	6	6	36 × 6	180	3·8	1·60	104	**2,025**

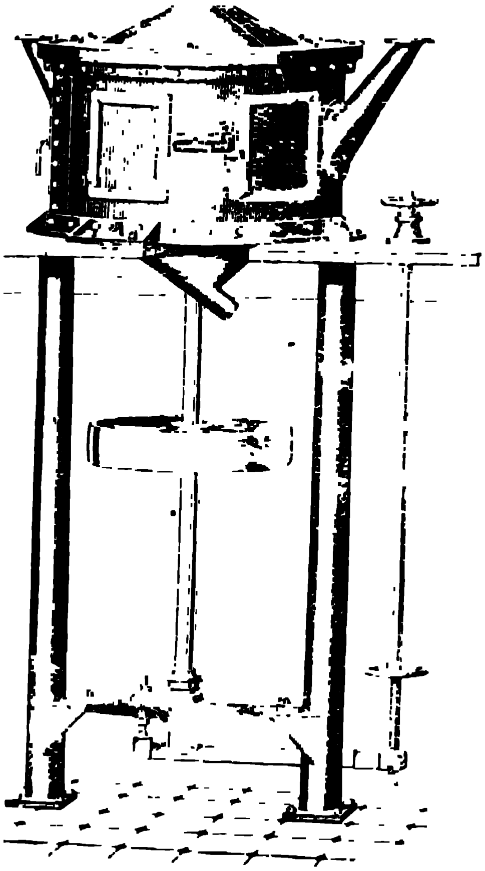
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

The "Reform" Cone Mill.

Mounted on Columns.



Cone.—The cone is of close-grained cast-iron, having suitable dovetails cast on it to receive emery composition. The eye is bored true to fit tapered spindle and a featherway cut. It is carefully balanced after being fitted on the spindle.

Baseplate.—This is a strong casting, suitable for bolting either to purchasers' floor or framework, or to iron columns supplied by us. It has turned grooves to take the inner casing, and is machined to carry the swivel neck bearing.

Neck Bearing.—The Neck Bearing is in halves in all the larger sizes, and of extra large bearing surface in all sizes. It is made self-aligning, a point of great importance where the machine has to be assembled by semi-skilled labour. It is lined with high-class anti friction metal, and has suitable oil grooves.

Lubrication is effected through a hole drilled down through the centre of the spindle and radial hole to meet it.

Inner Case.—This is made in 3, 4, 6, 8, 10, or 12 segments, according to size of machine, and is of strong yet light design. Each segment is removable by loosening two screws, and all segments are interchangeable. Suitable arrangements are made for attaching wirecloth covering.

Brakes.—Brake Blocks are made from our special composition rubber, extremely durable, and at the same time resilient. Their action is such as to reduce breakage to a minimum. Suitable arrangements are made for adjustment by means of screws attached to stout backs dovetailed into the brake blocks.

Outer Casing.—This is of stout plate surmounted by a strong cast-iron ring. Doors are fitted opposite each brake to allow of access for their adjustment. Two connections for coupling up to a fan or exhaust system are provided and the whole is made perfectly dust-tight.

Feed.—All these Cone Mills are fitted with improved self-regulating feed, which ensures the machine being kept full when at work, and at the same time prevents overloading. This is a most important consideration. An underfed machine always gives a high percentage of broken grains, while an overfed machine gives badly milled rice, and may choke and cause a stoppage. The special feeding arrangement automatically controls the inlet of rice and eliminates all trouble.

Capacities and Dimensions.

Ref. No.	Top Dia. of Cone	Capacity per Hour.	Space Occupied.			Pulley.		Power Required	Approx. Shipping		Price
			Length.	Width	Height above Floor	Dia. by Width	Speed.		Weight.	Measurement	
	Ins.	Lbs.	Ft. Ins.	Ft. Ins.	Ft. Ins.	In Ins.	R.P.M.	H.P.	Tons.	Cub. Ft.	Rs.
3	40	2,500	5 2	5 2	3 4	30×7	265	8	2·85	175	3,845
4	50	4,000	6 0	6 0	3 6	36×7	220	12	4·50	200	4,940
4a	54	4,200	7 0	6 0	3 6	40×8½	200	16	4·50	220	5,050
5	60	5,500	7 0	7 0	3 10	52×9	180	20	5·75	245	6,040
6	70	8,000	9 0	8 0	3 6	54×10	154	25	7·00	400	..
7	79	12,000	10 0	9 0	3 6	66×12	135	32	8·50	480	..

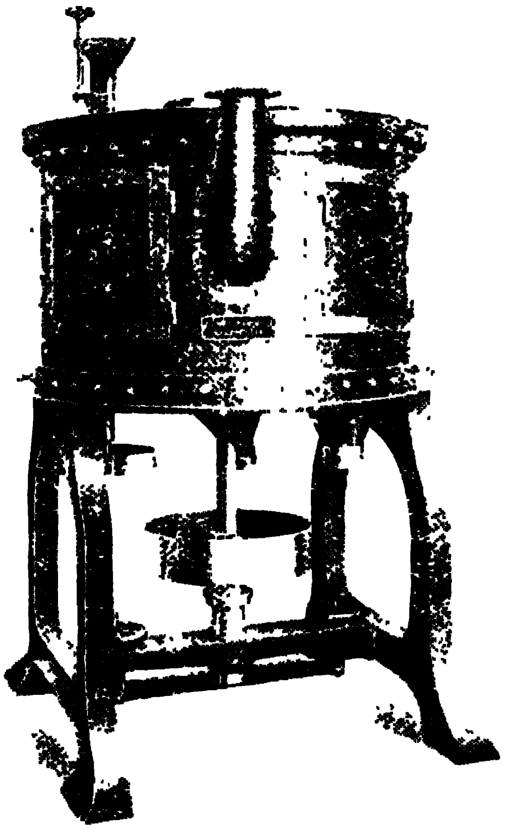
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

The "Reform" Cone Mill.

On Side Frames.



Most Important Operation.—The scouring or pearling of the rice grain to remove the pericarp underlying the husk is necessary to secure that white appearance demanded by most markets, and is probably the most important of the various operations in rice milling.

Even under the most favourable conditions a considerable percentage of the grains are broken in this process, and if unsuitable machines are used the loss in this way may be very great.

Cone Mills.—Cone Mills have long been recognised as the best type of machines for this work.

Of late years there has been considerable controversy as to the best shape, size, speed, etc., of cone mills, caused largely by differing opinions as to the relative values of the quantity and quality of work done.

Best Results.—In designing the "Reform" Cone Mill, the makers have aimed at producing a machine capable of giving the best milling results, *i.e.*, minimum breakage and good appearance. Output has been a secondary consideration, but our machines will be found capable of doing the maximum work consistent with low breakage and a bright, clean sample of rice.

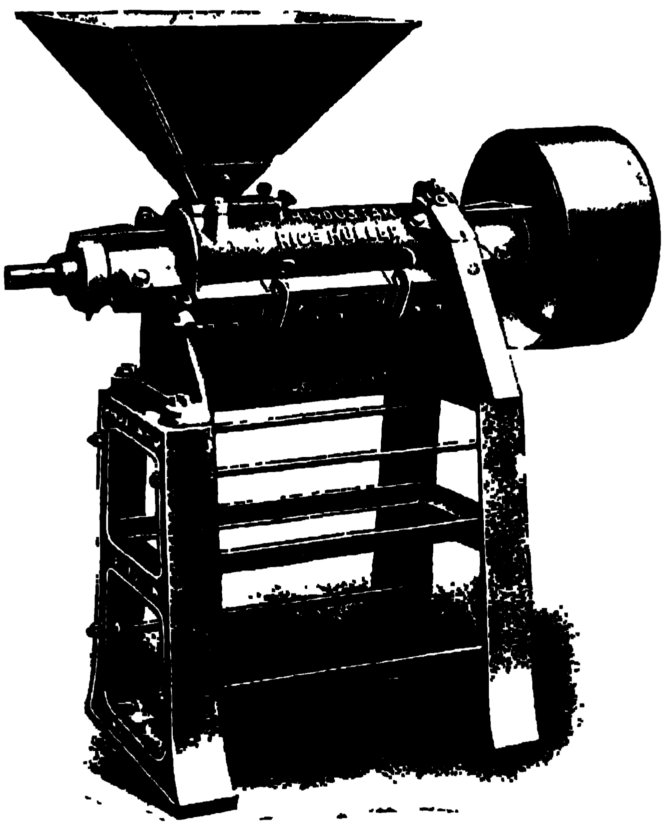
Where output is of prime importance, or the grain to be dealt with is of such a nature that it will stand, or requires, hard treatment, we are prepared to offer cone mills of special design.

Capacities and Dimensions.

Ref. No.	Top Dia. of Cone.	Capacity per Hour.	Space Occupied.						Driving Pulley.		Power Required.	Approx.		Price.
			Length		Width.		Height.		Dia. by Width.	Speed.		Weight.	Measure-	
	Ins.	Lbs.	Ft.	Ins	Ft.	Ins	Ft.	Ins.	Ins. Ins	R.P.M.	H.P.	Tons.	Cub. Ft.	Rs
1	25	1,000	3	2	3	2	5	3	20 × 5	460	5	1·30	80	2,745
2	30	1,500	4	1	4	1	6	0	24 × 6	360	6	1.75	93	3,075
3	40	2,590	5	2	5	2	6	6	30 × 7	265	8	2.50	120	3,845

The "Hindustan" Rice Huller (without Polisher).

On Cast-Iron Stand.



Size of Belt.

It should be specially noted that to ensure the best results a 6-in. wide belt of good quality should be used for driving the machine.

Daily Capacity:—

First Hulling 100 mds. per day of 12 hours, unpolished rice. Second Hulling 200 mds. per day, polished rice.

The above are actual working results.

The machine as illustrated is intended for use where polishing is not required, or in large factories where polishing is done separately.

The "Hindustan" Rice Huller has an established reputation as a simple, strong and efficient machine for Hulling Paddy. We have supplied hundreds of these to all parts of India where Paddy is grown. All parts of the machines are renewable and we carry large stocks of screens, hulling drums and other parts.

No.	Description.	Paddy Hulled per day. Mds.	DRIVING PULLEY		B. H. P. required.	Approximate Weight. Cwts.	Price Rs.
			Size. Ins	Revolutions per minute.			
1A	Huller only, without stand	150—300	16 × 7¼	500	10	4¼	655
1B	„ with stand only ..	150—300	16 × 7¼	500	10	5	770
	„ polisher and stand ..	100	16 × 7¼	500	13	8¾	1,24

Prices of spares on page 644.

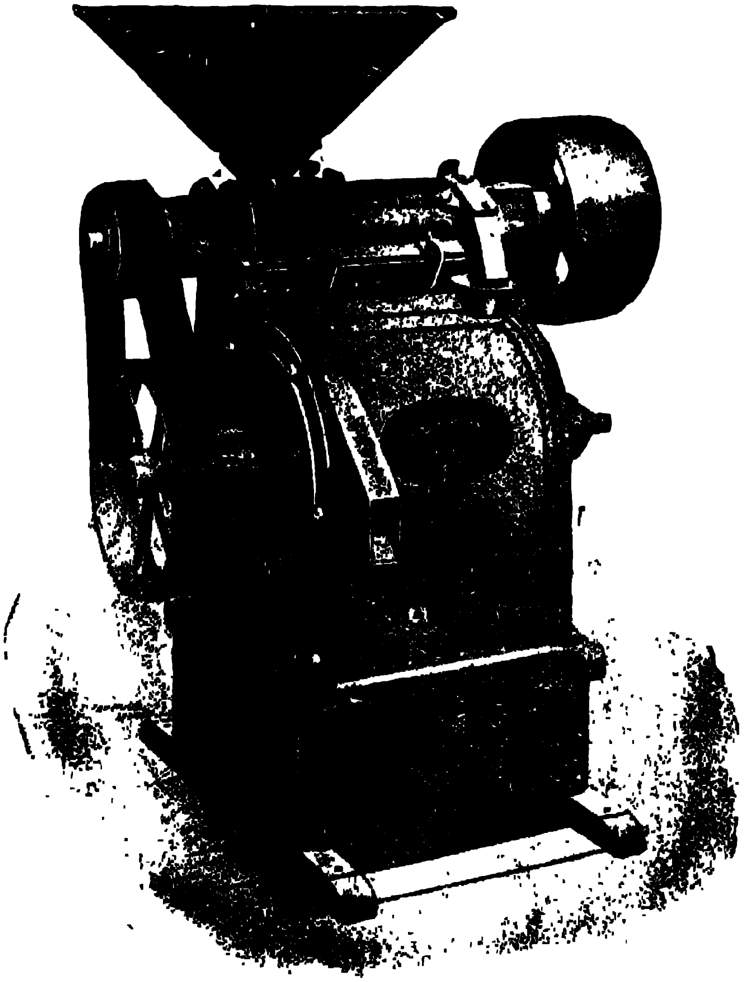
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON.

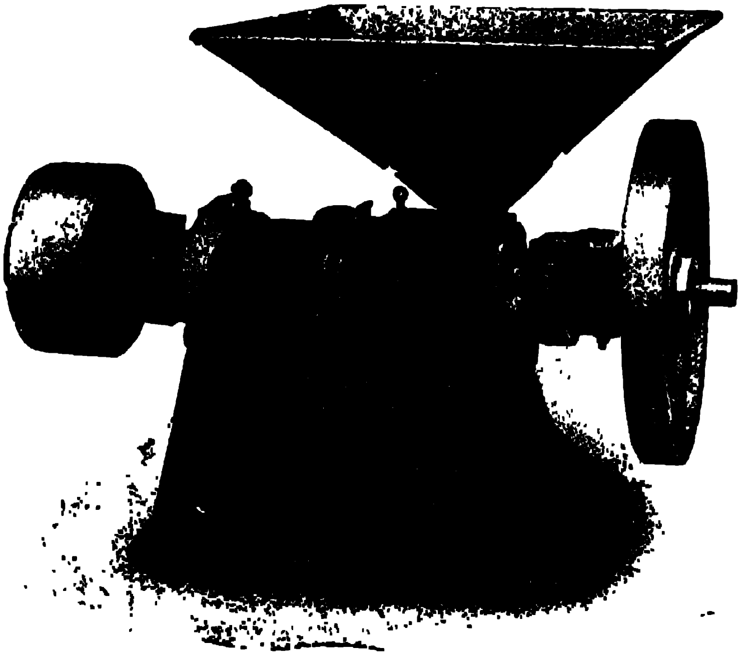
The "Hindustan" Huller with Polisher.

The illustration shows the "Hindustan" Huller combined with Polisher. For particulars see previous page.



The "Hindustan" Rice Huller.

No. 2 Small Size.



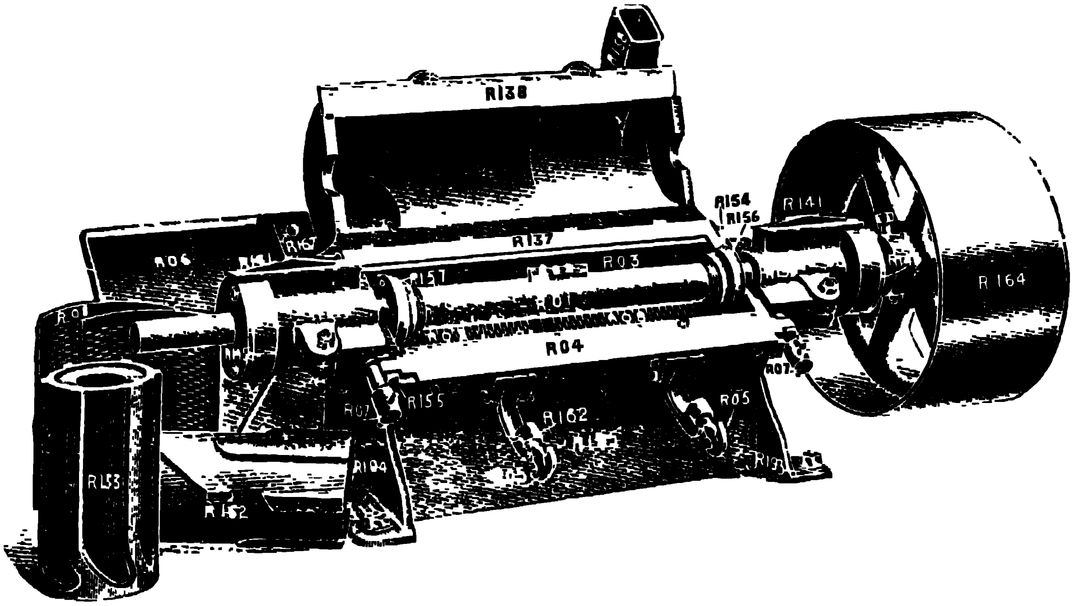
In order to meet the demand for a Rice Huller requiring little power and of small capacity, we have placed upon the market this machine which is built upon the same lines as No. 1 Huller. The paddy should be in good condition, and free from sticks, straw, dirt, etc.

Capacity 50—60 maunds per day first hulling and 80 maunds for second hulling.

Particulars.

Diameter of Driving Pulley	8 inches.
Width of Driving Pulley	3½ „
Approximate R. P. M.	650
Power required .	5½—7 B.H.P.
Height of huller .	36 inches.
Gross weight ..	2 cwt.
Price, ..	**Rs. 362-0**

The "Hindustan" Rice Huller Parts.



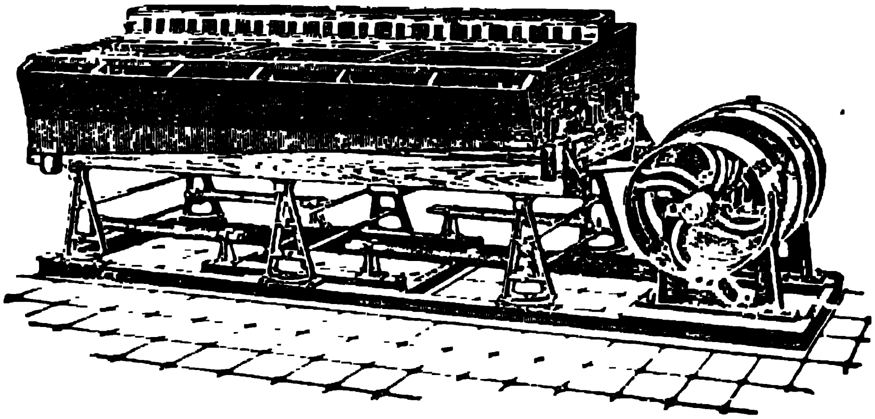
No	Name of Part.	Price, Rs.	No.	Name of Part	Price Rs.
R01	Huller Shaft	48 12	R140	Left hand Bearing for huller	56 4
R03	Upper Screen Holder	3 12	R141	Cap for bearings R139 and R140	
R04	Huller Blades	3 12	R142	Bearing for polisher	56 4
R05	Short Thumb Screw for clamp	-	R143	Cap for R142	
R06	Sheet Iron Collapsible Hopper		R144	Lubricating Collar	9 6
R07	Steel Blade Adjusting Screws	7 8	R145	Cover Plate for R140	5 10
R08	Huller Screen	3 2	R146	" " " R139 and R142	5 10
R09	Sheet Iron Curved Front Cover		R147	Cast-Iron Outlet Spout from polisher	2 8
R010	" " making up piece		R148	End Plate for Polisher Drum	15 0
R011	" " outlet Spout		R149	Cast-Iron Inlet Spout to polisher	1 4
R012	Sheet Iron inlet Spout to polisher		R150	Lower Screen Holder	2 8
R013	Polisher Screen	31 4	R151	" " " Support	5 0
R015	Setscrew for securing hopper		R152	Chilled Iron Cylinder, head end	22 8
R017	Thumb Screw for screen holders		R153	" " " tail end	22 8
R019	Polisher Shaft	18 12	R154	Brass Hinge	.
R020	Setscrew to secure huller outlet	.	R155	Guide for huller blade	3 12
R021	Sheet Iron Curved Door		R156	Nut for huller shaft R H	9 6
R023	" " Back Plate		R157	" " " L H	9 6
R024	Hinge for R021		R158	Cast-Iron Outlet Spout from huller	5 10
R025	Leather strips, 7" × ½" for polisher		R159	Lid for R158	. . .
R026	" " 1" × 1" " "		R160	Loose Collar	. .
R027	Wood Section of Polisher Drum		R161	Door Button	. . .
R028	Bolt for upper screen holders		R162	Clamp for huller casing	2 4
R029	" " lower screen holder support		R163	Three Jaw Spanner	1 14
R030	Set-screw for huller bearings		R167	Cast Iron Seat for feed hopper	11 14
R031	" polisher bearings		R168	Brass Bush for huller bearing	13 2
R032	Slide for R167		R169	" " " polisher bearing	13 2
R134	Side with circular opening	53 2	R193	Side Casting, huller only, R H	. . . .
R135	" without circular opening	70 10	R194	" " L H	. . . .
R136	Circular Cover for R134	78 2	R195	Front Casting, Huller	. . . .
R137	Huller Casing, bottom half	75 0	R294	Stand for No 1B Huller	115 0
R138	" " top half	68 12	R296	Long Spout for No. 1A and 1B Huller	. . . .
R139	Right-hand Bearing for huller	56 4	R508	Flywheel	75 0
			R515	Short Stand for No 1A Huller	62 8

The Paddy Eliminator or Separator.

Advantages.—This machine is now well-known wherever rice is milled. Its introduction has made it possible to increase the percentage of whole grains obtained in milling by reducing the amount of breakage made in the shelling process

This it does by effecting a nearly perfect separation of shelled from unshelled grains, thus avoiding all necessity for returning much shelled grain with the unshelled for re-treatment.

Principle.- In this machine, separation is effected on the basis of the specific gravity of the grains treated, the lighter (unshelled) grains being shaken to the top, and the heavier (shelled) grains to the bottom of peculiarly shaped compartments or chambers. Suitable outlets are provided at both ends of the chambers



Capacities and Dimensions.

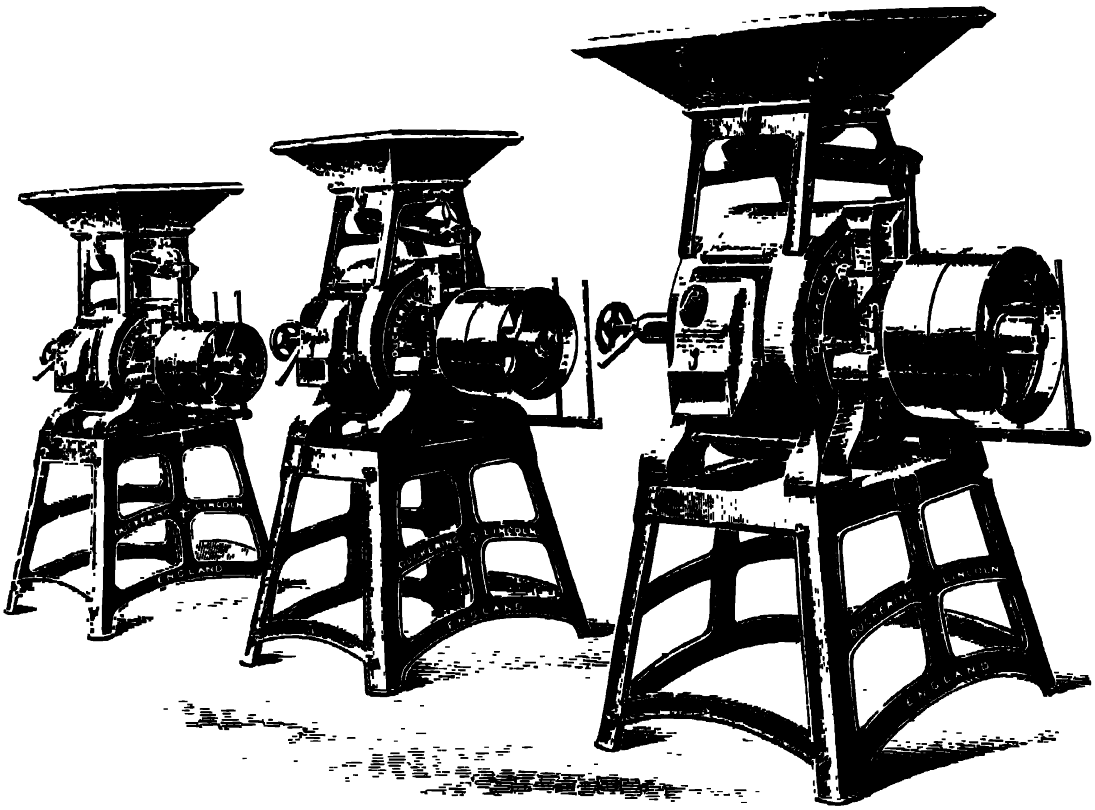
Ref. No.	No. of Chambers.	Capacity per Hour.	Space Occupied Length.		Width		Height		Pulley Dia. by Width.	Power Required.	Approx. Shipping Weight	Measurement.	Price.
		Lbs.	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.	Ins. Ins.	H.P.	Tons.	Cu. ft.	Rs.
Two-Floor Machines.													
4	12	1,200	8	9	6	0	4	7	12×4	0.2		120	On application.
5	16	1,600	10	3	6	0	4	7	16×4	0.4	1·40	115	
6	20	2,000	11	8	6	0	4	7	16×4	0.6	1·60	160	
7	24	2,400	13	0	6	0	4	7	20×4	1·0	1·75	175	
8	30	3,000	15	0	6	0	4	7	20×5	1·5	2·00	250	
Three-Floor Machines.													
9	18	1,800	8	9	6	0	4	10	20×4	0·6	1·25	140	**3,075**
10	24	2,400	10	3	6	0	4	10	20×4	1·0	2·00	170	**3,295**
11	30	3,000	11	8	6	0	4	10	24×6	1·5	2·20	215	**3,735**
12	36	3,600	13	0	6	0	4	10	24×6	2·0	2·75	250	**3,950**
13	45	4,500	15	0	6	0	4	10	24×6	3·0	3·00	300	**4,610**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Improved Vertical Stone "Atta" Grinding Mills.



These mills have all the recent improvements found necessary from the manufacturer's long experience in this class of machinery, and are fitted with the best French Burr Stones. Accurate adjustment can be made by means of the end hand screw so that the stone can be set for producing "Atta" or "Soojee." When used in connection with the improved dresser they turn out first-class "Maida." The mills are also largely used for splitting pulse (Dal) and are specially suitable for the "Arhur" and "Mussur" varieties. The stones, when worn, can be dressed or sharpened by any intelligent labourer. The mill is provided with fast and loose pulleys and belt shifting gear, but can also be fitted with a single pulley of suitable size for motor drive.

We have supplied large numbers of these mills to private owners, military farms, etc., with Tangye's well-known oil engines, for driving them.

Dia. of French Burr Stones.	Approx. Output per hour in Maunds. Atta or Soojee.		Size of Oil Engine Recommended.	Dia. and Width of Pulleys.	R.P.M.	Belt Drive. **Price.**
15 ins.	2-3½	6	7 B.H.P.	12×5 ins.	575	**Rs. 725**
18 "	4-5	8	10 B.H.P.	14×5 "	500	**" 870**

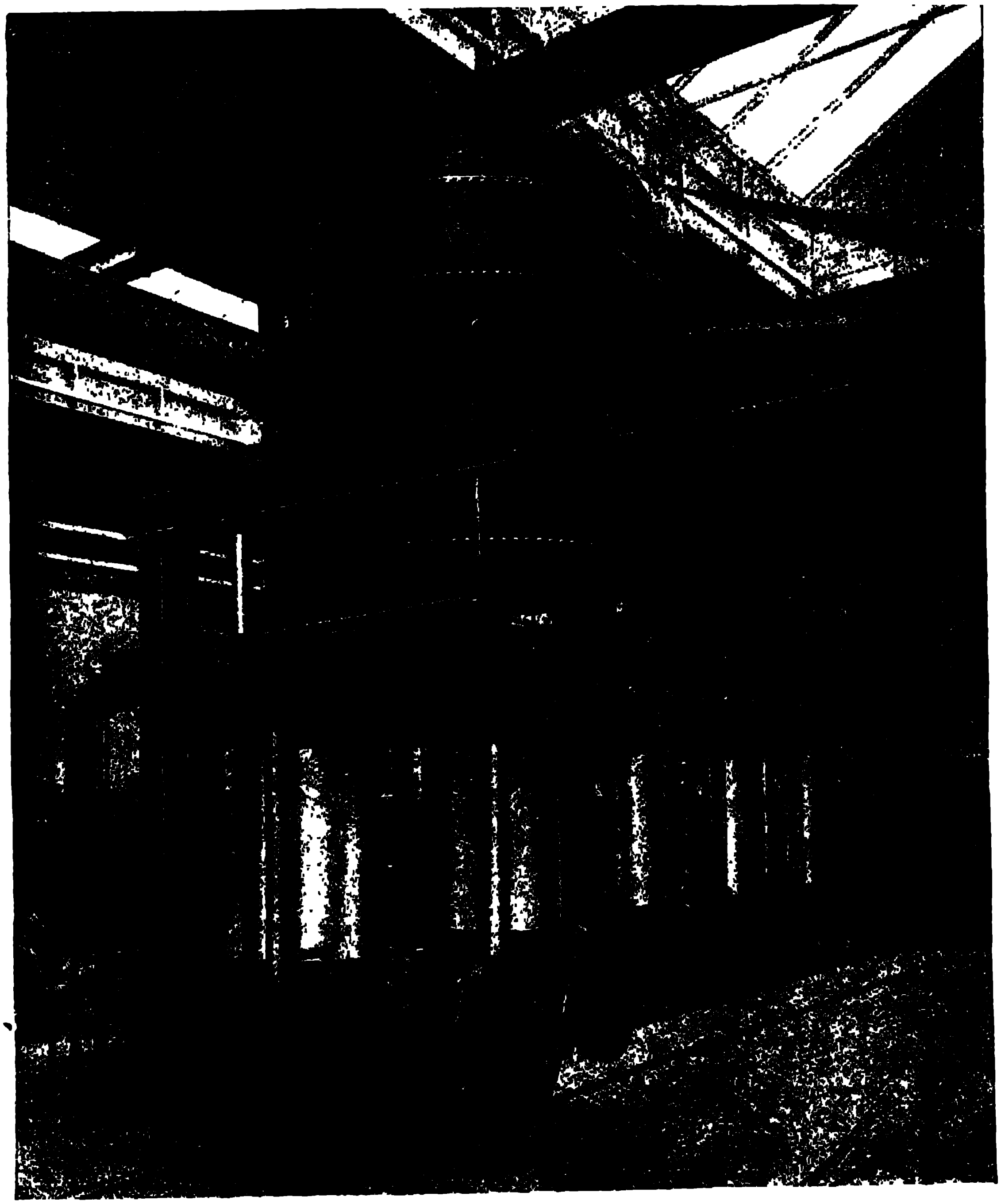
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Oil Mill Machinery.

By Messrs. Frans Smulders, Utrecht, Holland.



Hydraulic Pressing Plant with Movable Boxes.

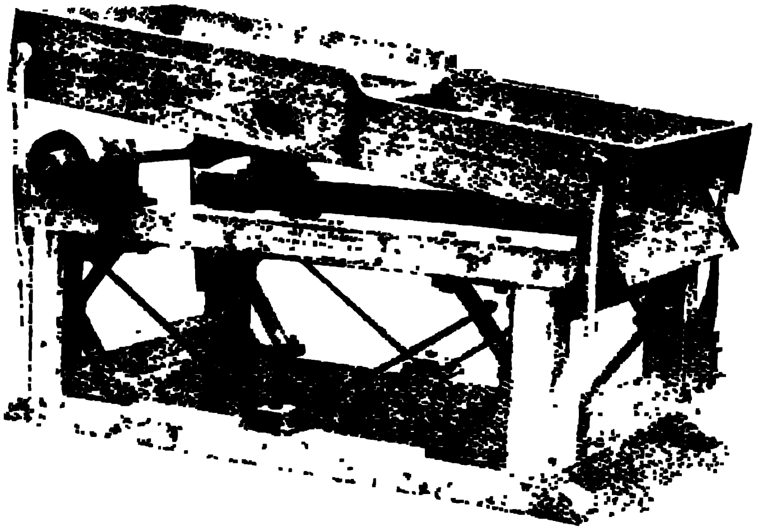
The manufacturers, Messrs. Frans Smulders, Utrecht, Holland, represented by us for the whole of India, and Burma, are specialists with many years' experience in Oil Seed Crushing and Oil Refining Machinery. They are one of the few firms in the world manufacturing plant, covering every pressing system known, hydraulic and mechanical, consequently they are in a good position to deal satisfactorily with requirements, and able to put forward whichever type of plant a buyer prefers to instal.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

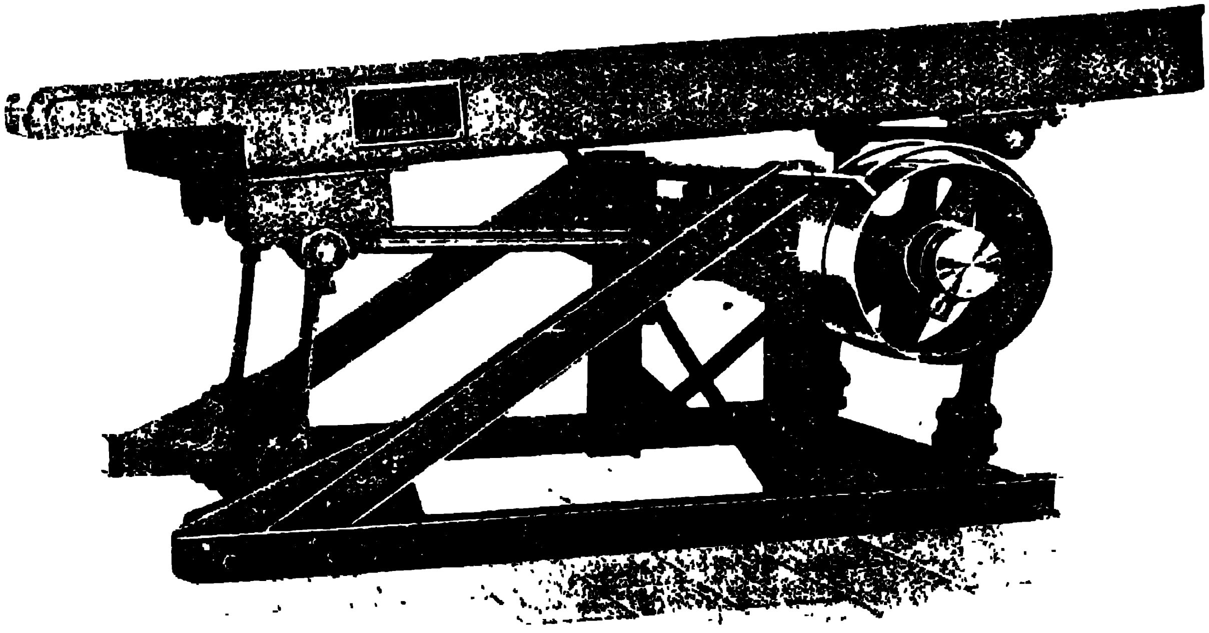
JESSOP & CO. LTD.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Seed Cleaning Machinery.



Simple Seed Screens.



Cleaning Machine or Sifting Apparatus for Copra, Palm-seeds, etc.

Seed Cleaning Machinery.

To obtain the best quality of oil and to reduce the wear and tear of the machinery, particularly if the machine used is an Expeller, the material must be thoroughly cleansed from foreign matters such as sand and iron particles that are often found with the seeds.

Simple Seed Screens.

Simple self contained screens are used for cleaning seed or grain in small mills, but larger machines fitted with a dust fan can be supplied to deal with greater capacities.

Surface of the Sieve.		Pulley.		R.P.M.	B.H.P.	Nett Weight in Cwts	Capacity per hour in Cwts. for small Seed.	Space Required.			Price, Rs.
Length.	Width	Diam.	Width.					Length.	Width.	Height.	
4' 4"	1 8"	8¾"	3¼"	250			20-35	5' 10"	4' 1"	3' 10"	1,472

Cleaning Machine or Sifting Apparatus for Copra, Palm-seeds, etc.

This apparatus is constructed for two operations (1) working as a cleaning machine, in order to separate from the material the sand and coarser substances, and (2) working as a sifting apparatus to separate the already ground material into the coarser and the finer meal.

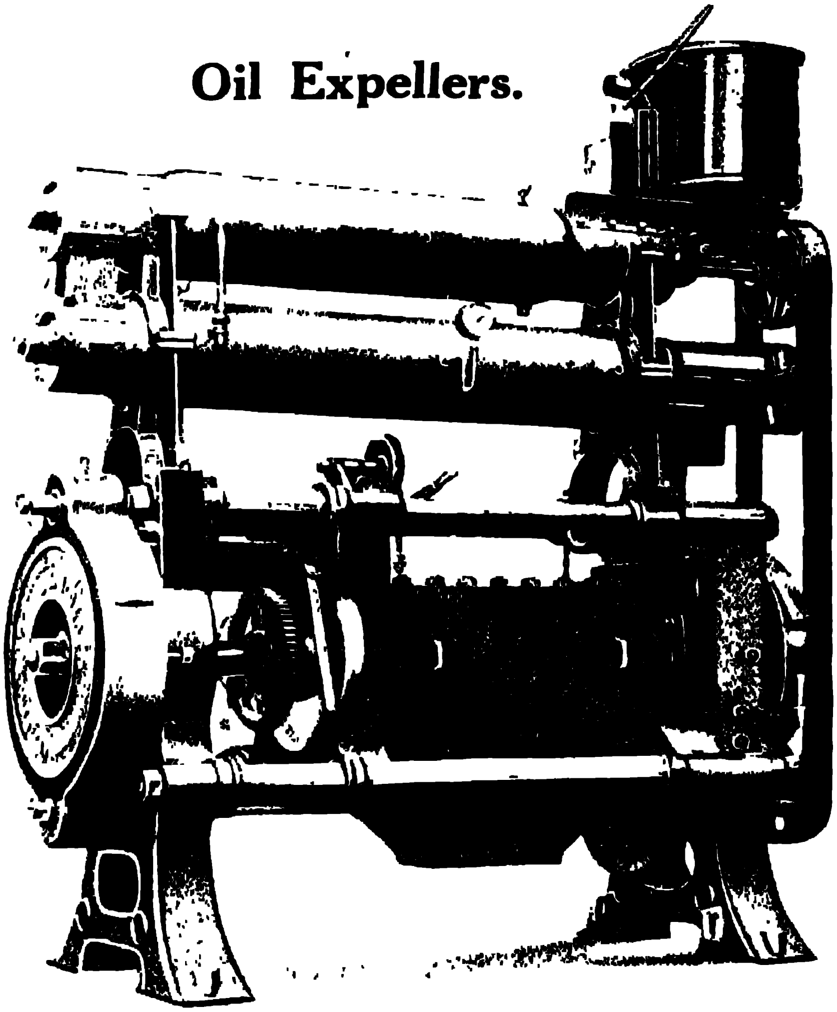
Surface of the Sieve.		Pulley.		R.P.M.	B.H.P.	Nett Weight in Cwts.	Capacity per hour in Tons.		Space Required.			Price, Rs
Length.	Width.	Diam.	Width.				Palm-Kernels.	Copra.	Length.	Width.	Height.	
5' 5"	1' 3¾"	1' 1¾"	4"	250	0·6	5·6	25/35	17½/27½	5' 5"	2' 5½"	3' 1½"	1,082
6' 1"	1' 7¾"	1' 1¾"	4"	250	0·75	6·8	55/65	40/50	6' 1"	2' 9½"	3' 1½"	1,220
6' 6¾"	2' 1¾"	1' 1¾"	4"	250	1·0	7·8	80/90	60/70	6' 6¾"	3' 3½"	3' 1½"	1,495
9' 0¼"	2' 7½"	1' 1¾"	4"	250	1·3	8·6	105/115	80/90	9' 0¼"	3' 9¼"	3' 1½"	1,792
9' 10"	3' 1½"	1 1¾"	4"	250	1·5	9·5	130/140	95/105	9' 10"	4' 3¼"	3' 1½"	1,982

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Oil Expellers.



We illustrate above an "Expeller" which is a mechanically operated machine suitable for working Linseed, Sesame Seed (Teel or Gingelly), Groundnuts, Copra, Burdee Seed (Safflower), Yamtil, Mustard Seed (Surcea), etc., with very satisfactory results.

The Expeller type of oil mill has in recent years become increasingly popular as it combines in one machine of moderate price the processes for which several expensive machines would otherwise be necessary. One man with experience can attend to several Expellers, thereby affecting considerable saving in manufacturing expenses. No foundations are necessary, no hydraulic pumps, valves, etc., moulding machines, press cloths, or press plates are needed and only a small floor space is occupied. The machine is entirely automatic and designed to work continuously. To give an idea of the capacity, one Expeller will deal with approximately 5 maunds of Linseed per hour. All oil bearing seeds can be crushed with the exception of Castor and Mohwa Seeds.

Pulleys		R.P.M. depending on the Seed	B.H.P.	Heating Trough		Nett Weight in Cwts.	Capacity per hour of or Linseed in Mds.	Space Required.			Price. Rs.
Diam.	Width.			Diam.	Length			Length.	Width.	Height.	
1ft 9½ins.	4¾ ins	200/280	7—10	10ins.	8ft. 4ins	76	5	8ft. 4ins.	4ft. 3ins.	9ft. 6ins.	10,350

Oil Expellers. Some Users in India.

Oil Expellers are very popular among Bombay Oil Mill Owners and large numbers can be seen at work there. The following mills are among those using Frans Smulders' Expellers:—

Bombay Flour and Oil Mills (Volkart Bros.) Several.

Vali Mohamed Bhai Mills, Bombay.

The New Luxmi Oil Mills, Mazagaon, Bombay.

Manikbag Oil Mills (Manikchand, Motichand and Company), Belgaum.

Moradabad Oil Mill Company, Moradabad, U. P.

Narain Dass Luchman Dass Oil Mills, Cawnpore.

Mr. B. Sadhukhan, Calcutta.

Lalla Radha Kishen Kaour (Lahore District). Two machines.

Seed Preparation. It cannot be too strongly emphasised that the wear and tear in Expellers is greatly reduced and the life of component parts prolonged by carefully removing dust or other foreign matter from the seed before it enters the Expeller. Simple seed cleaners are illustrated on preceding pages. A number of seeds also require to be flattened or crushed before extracting the oil.

Form of Enquiry. It will always assist us in dealing fully with Oil Mill enquiries if the following information is supplied :—

1. Kind of seed to be treated
2. Capacity per hour
3. Power available
4. Short description of local circumstances

If Refining Plants are required for oils and fats, please give the following particulars:—

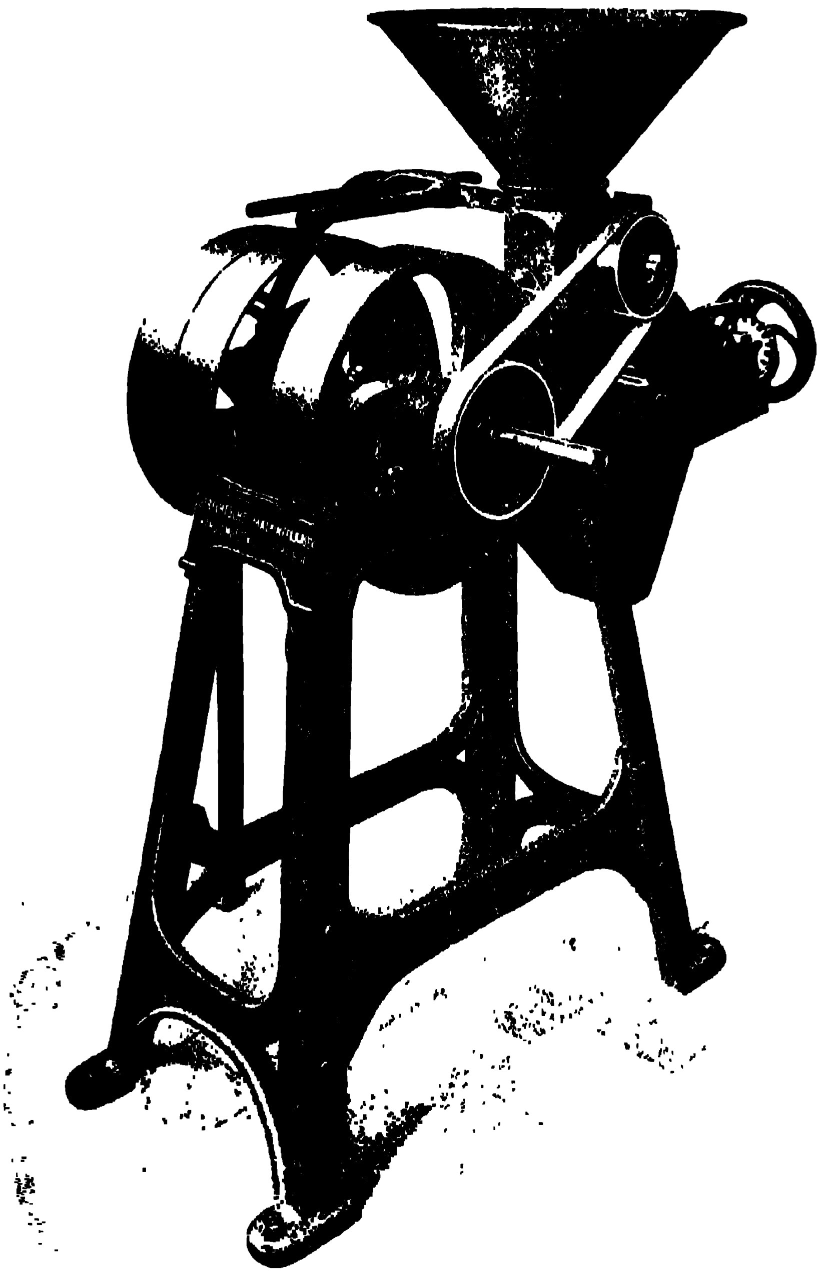
1. Gross quantity of oil to be refined each 24 hours.
2. Kind of oil or fat to be treated.

For Extraction Plants it is important to have the following details:—

1. Kind of seeds or cake.
2. Approximate percentage of oil in the seed or cake before extraction.
3. Quantity of the above material to be treated each 24 hours.

Delivery of Expellers and Spares.

We stock Expellers in Bombay and Calcutta and also maintain a regular stock of spare parts for the benefit of buyers.



Small Flattening Mill.

These Flattening Mills are arranged for flattening Linseed, Rapeseed (Mustard), etc., and similar small seeds. They are provided with smooth rollers of different diameter, which flatten the seeds without grinding them to meal.

One of the rollers has a fixed position, whilst the other can be adjusted in horizontal bearings, fitted with set screw device and safety-spring. This spring allows one of the rollers to give way easily when hard objects drop into the mill, thus avoiding, as much as possible, any damage to the rollers.

The Nos. 1 and 3 Mills are built for power-drive and are fitted with fast and loose pulleys. Nos. 2 and 4 are built for hand-power and are fitted with a large hand flywheel. Nos. 3 and 4 are specially designed for treatment of large seeds and are provided with a bean crusher for this purpose.

No.	Dimensions of the Rollers			R.P.M.	B.H.P.	Nett Weight in Cwts.	Capacity.	Space Required.			Pulley.		Price. Rs.
	Diam. Big Roller.	Diam Small Roller.	Width Roller.					Length	Width.	Height.	Diam.	Width.	
1	1' 6"	1'	4"	200	2	4·5	Dependent on the material to be treated	3' 11¼"	2' 11½"	4' 9"	1' 6"	4"	800
2	1' 6"	1'	4"					3' 11¼"	2' 11½"	4' 9"			
3	1' 6"	1'	4"	200	2	6		3' 11¼"	2' 11½"	5' 9"	1' 6"	4"	On application.
4	1' 6"	1'	4"					3' 11¼"	2' 11½"	5' 9"			

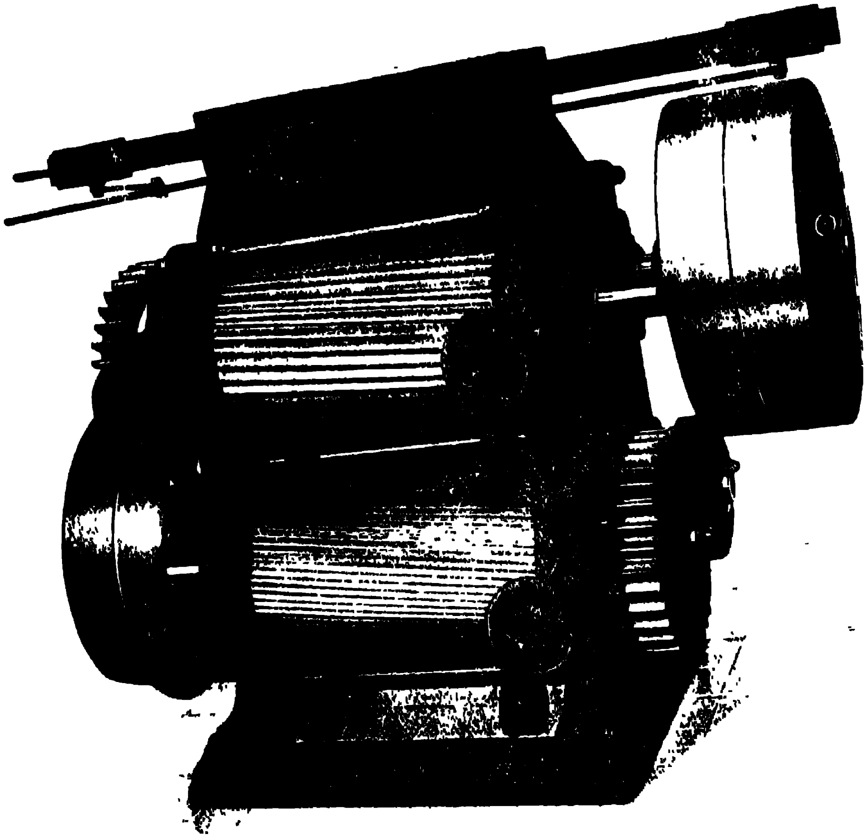
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Breaking Mills for Copra, Palm-Kernels, Etc.

With Two Pairs of Rolls.



Rolls.		R.P.M.	Pulleys.		B.H.P	Nett Weight in Cwts.	Capacity per hour for Copra in Mds.	Overall Dimensions.			Price, Rs.
Diam.	Length.		Diam.	Width.				Length.	Width.	Height.	
2¼"	1' 3¾"	110-140	2' 5½"	3¼"	5-6	50	22	5' 3"	3' 11"	4' 9"	9,704
2¼"	1' 7¾"	110-140	2' 5½"	4¼"	6-7	56	28	5' 10"	3' 11"	4' 9"	10,596
2¼"	1' 11¾"	110-140	2' 5½"	5¼"	7-8	62	36	6' 4"	3' 11"	4' 9"	11,490
2¼"	2' 3½"	110-140	2' 5½"	5½"	8-9	68	45	6' 9"	3' 11"	4' 9"	12,150
4½"	2' 3½"	95-120	3' 3½"	6¼"	9·5-10·5	96	59	7' 7"	4' 9"	5' 9"	14,400
4½"	2' 7½"	95-120	3' 3½"	7"	11-12	102	67	8' 2"	4' 9"	5' 9"	On enquiry
4½"	2' 11½"	95-120	3' 3½"	8"	12-13	111	75	8' 9"	4' 9"	5' 9"	
4½"		95-120	3' 3½"	8¼"	14-16	122	84	9' 2"	4' 9"	5' 9"	

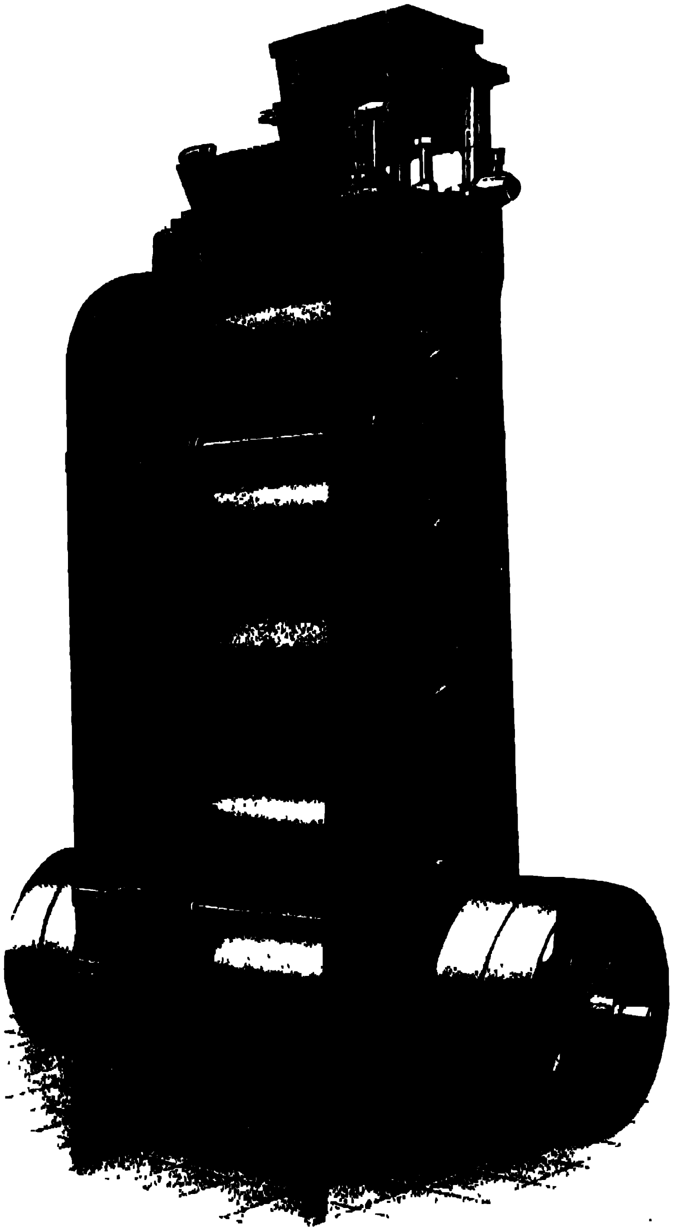
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEE

RANGOON, MADRAS,
BOMBAY, LONDON.

Roller Mill.

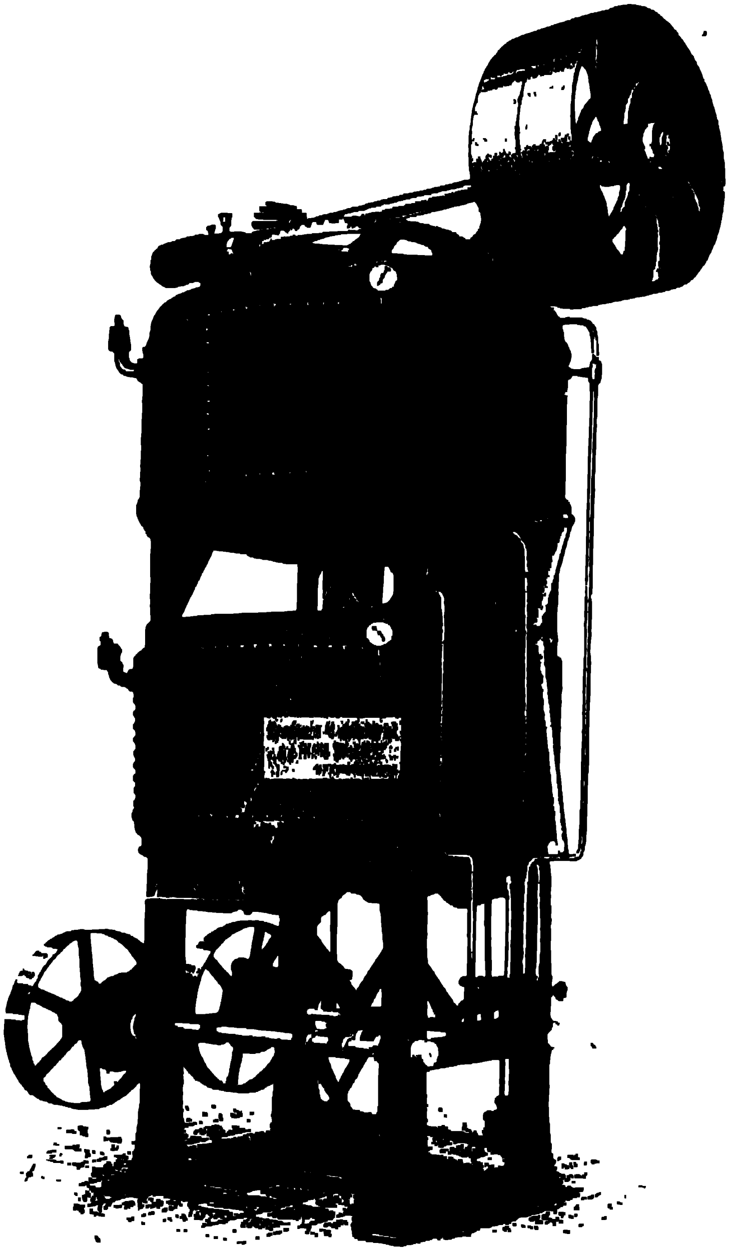
These Mills are more particularly adopted for grinding most oleaginous seeds, such as Linseed, Rapeseed, Cotton-seed, Sunflower-seed, as well as for disintegrating larger oleaginous fruits such as Palm-kernels, Copra, etc. They supply the product ready ground to the greatest degree of fineness required for Hydraulic pressure.



The seeds are brought from a hopper by means of a spreading roller provided with a scraper. They descend along a zig-zag path under the rollers and are ground with a gradually increasing pressure. The seeds are guided by means of adjustable inclined plates which at the same time play the part of scrapers and clean the rollers.

The pressure on the material is obtained, either by the weight of the rollers themselves, which, when the rollers are driven by pulleys, is greatly assisted by the pull of the belt, or by means of adjustable springs, in which case the rollers are driven by toothed wheels as illustrated above.

Full particulars and prices on application.



Seed Heating Kettles.

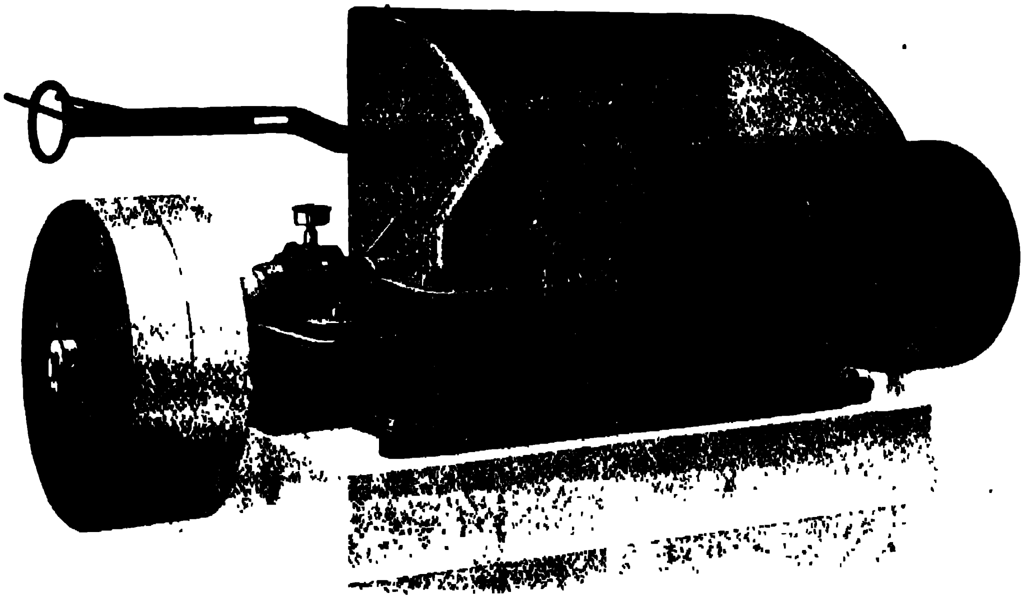
Single or Double (Superposed).

Seed Heating Kettles are principally used for heating and supplying the necessary moisture to the meal.

A spray is arranged inside the kettle to supply the necessary moisture and for heating, the kettles are steam jacketed around the sides and bottom. The meal is thoroughly mixed by a stirring device actuated by a bevel wheel and pinion. The heating and moistening is the last process the meal is subjected to before the oil is expressed, but if the meal is to be prepared for making feeding cakes, no moistening is necessary.

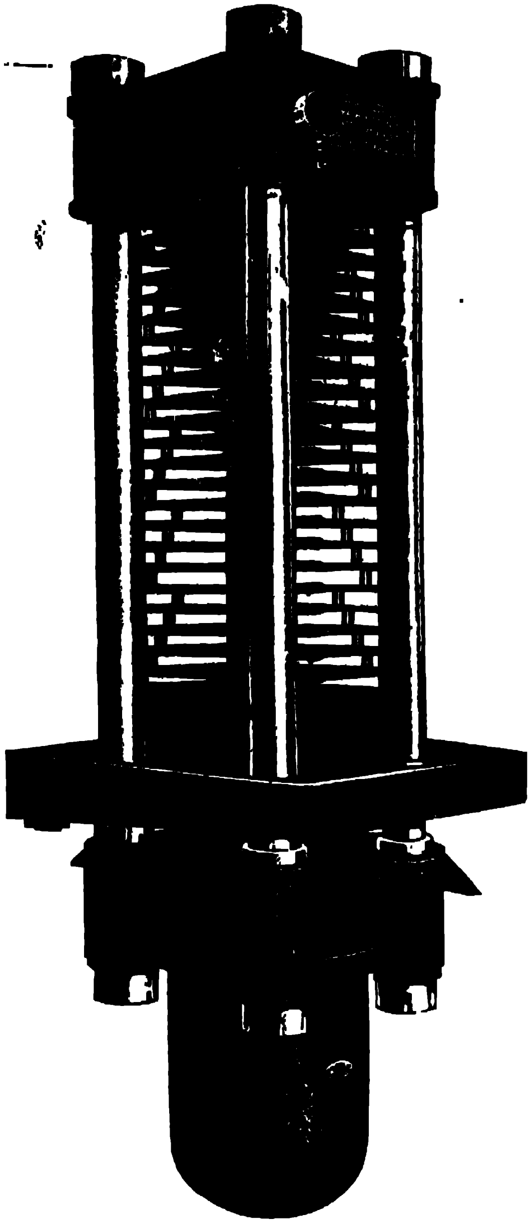
Type.	Inside Dimensions of Kettle.		Pulley.		R P M	R.	Kettle wit Automatic Fi ing Device		Kettle with Hand Filling Device.		Space Required.		
	Diam.	Dep	Diam.	idt			Nett Weight in Cwts.	Price, Rs.	Nett Weight in Cwts.	Price, Rs.	Length	Width.	
Single	3′ 11″	2′ 6″	3′ 3½″	6¼″	70	4	45		40	3,776	6′ 7″	4′ 3″	10′ 4″
	4′ 3″	3′ 7″	3′ 3½″	7¾″	70	5	62	7,552	57	6,400	7′ 1″	4′ 7″	11′ 6″
	4′ 11″	3′ 7″	3′ 3½″	8¼″	70	6·5	72	16,150	66	7,866	7′ 11″	5′ 3″	11′ 6″
Double	4′ 3″	2′ 6″	3′ 7¼″	7¼″	70	7	80	13,350	74	11,100	6′ 3″	4′ 7″	14′ 5″
	4′ 11″	2′ 6″	3′ 7¼″	8¼″	70	10	92	14,400	85	12,150	6′ 11″	5′ 3″	14′ 5″
	5′ 11″	2′ 9″		7¼″	100	14	120	17,920			8′ 6″	7′ 9″	11′ 5″

Copra Cutting Machines.



These machines are used to cut Copra into small pieces before it is sieved in preparation for the Breaking-mill. The cutting of the Copra is done by a number of knives which are placed in a helical line on a square shaft, and turn between toothed grates which are located on each side of the shaft.

Length over the Knives.	Diam. of Knives	R.P.M.	Pulley		B.H.P.	Nett Weight in Cwts.	Capacity per hour in mds. for Copra.	Space Required.			Price, Rs.
			Diam	Width				Length.	Width.	Height.	
1' 5"	11"	160	1' 11¾"	3¼"	2	10·0	22	5' 2"	2' 11"	3' 1"	2,030
2' 2"	11"	160	1' 11¾"	3½"	3	12·0	34	5' 7"	2' 11"	3' 1"	2,765
2' 8"	11"	160	1' 11¾"	4"	4	15·0	39	6' 1"	2' 11"	3' 1"	2,470



Anglo-American (Hydraulic) Oil Presses.

These presses are usually worked in batteries for the treatment of seeds with a low oil yield such as Linseed, Cotton-seed, Sunflower-seed, etc.

This plant is only installed for working on a large scale and in India, presses built for eighteen cakes are found to be the most suitable. The capacity of one press can be taken at approximately 375/400 lbs. of Linseed per hour.

If seeds of a high oil yield have to be treated a combination of Expellers for first pressing followed by Anglo-American Presses for a second pressing, makes an up-to-date Oil Mill suitable for all seeds with the exception of Castor-seed.

The principal characteristics consist, in the open construction and the free transmission of the pressure from one press plate to the next.

Diame Ram	Working Pressure in tons per sq. inch	Numb Ca	Dimensions of the corrugated part of the Press Plates.		Nett Weight in Cwts.	Space Required.			
			Length.	Width.		Length.	Width.	Height. Above Ground.	Height. Below Ground.
1' 4¾"	2·22	23	2' 11½"	1' 1"	156	3' 7¼"	3' 7¼"	8' 5¼"	3' 3½"
1' 4¾"	2·22	18	2' 11½"	1' 1"	153	3' 7¼"	3' 7¼"	7' 3½"	3' 3½"

Prices on application.

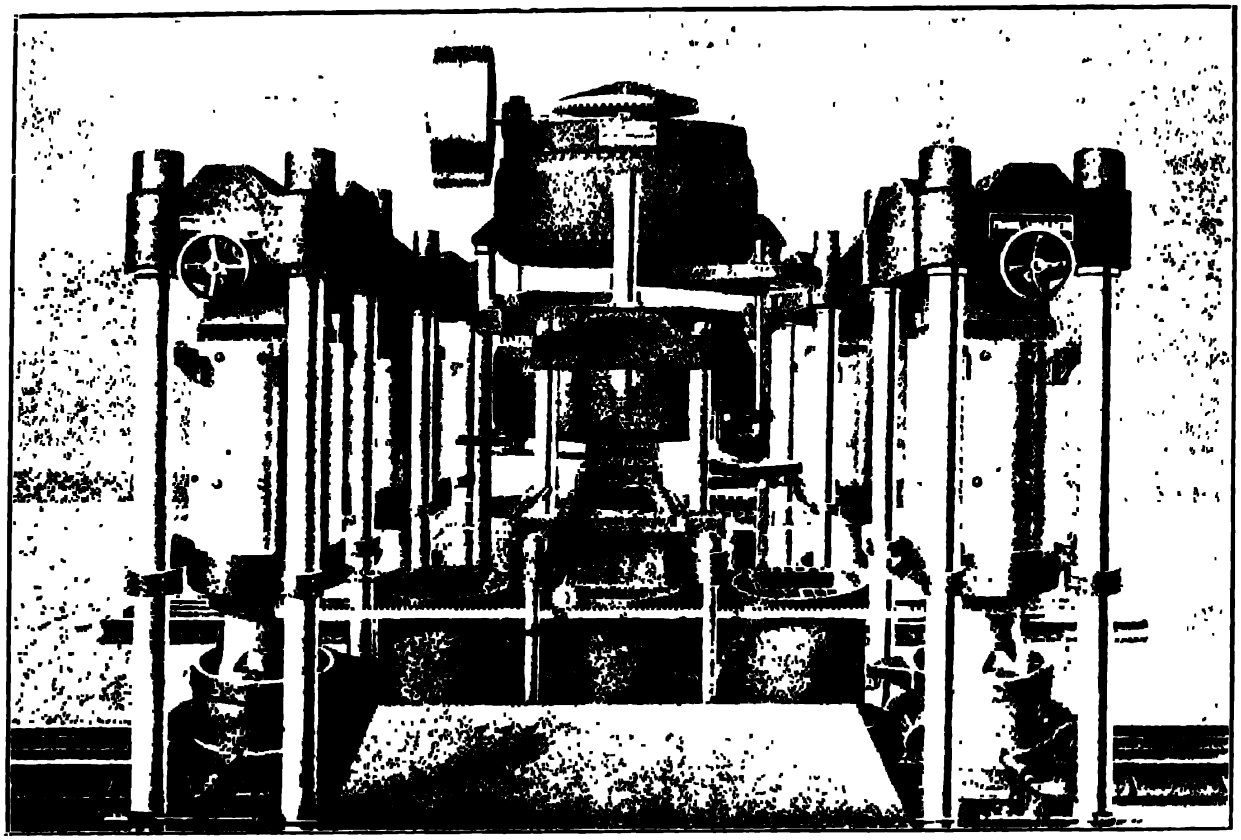
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

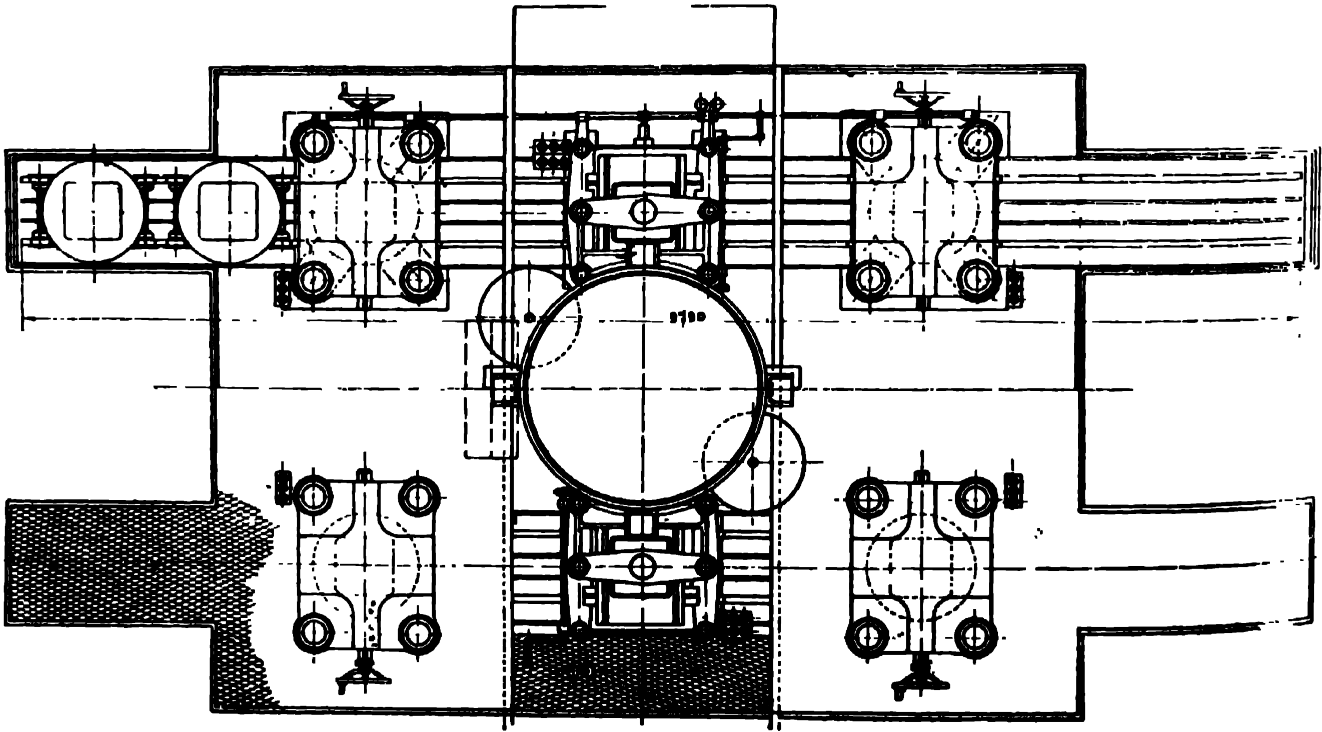
JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hydraulic Pressing Plant.

"Frasmu-Battery" System.





CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hydraulic Pressing Plant.

"Frasmu-Battery" System.

The illustrations on the opposite page show a Hydraulic Pressing Plant of the "Frasmu-Battery" System complete with four finishing presses.

The Plant has been designed for the treatment of seeds with a high oil yield, such as Copra, Palm-kernels, Groundnuts, Sesame Seed, Rapeseed, etc., which in general can be treated in one pressing, but is, however, suitably arranged for pressing seeds with a lower oil yield and also for the second pressing of various seeds.

The Plant, as illustrated, consists of the following:—

1. Heating apparatus.
2. Two charging presses.
3. Two movable systems of charging cages and pressure heads.
4. Four strong finishing presses with stationary press boxes.

The heating kettle, which is provided with two discharge openings with slides, under which the filling cups are fitted, is mounted in the centre, diagonally between the four finishing presses, and rigidly supported. The two charging presses are situated on opposite sides of the heating kettle, directly under the discharge outlets, and in line with two of the finishing presses, one being on each side so that the charging and discharging of the finishing presses can be carried out intermittently (see lower illustration) The finishing presses are built for a pressure of 2¼ tons per square inch The charge of each press box amounts to approximately 10 cwts. of copra for each filling; for other materials the charge is proportional to this figure, depending upon the character of the seeds in comparison with copra.

A comparison between the "Frasmu" and Seiher pressing plant with movable boxes reveals some rather interesting facts as under:—

1. A "Frasmu" plant can be obtained in four parts, hence one is able to start with a quarter or half the total plant, and extend at a later period. This cannot be done with the Seiher battery.

2 The capacity of a complete "Frasmu" Battery is approximately 100 per cent. more because of the time required for charging the press boxes, as two charging presses are serving four finishing presses. The same advantage applies to a second pressing

3. The ram of the charging press automatically lowers during charging so that a regular height of the layer of meal is obtained. The height can be regulated whilst working.

4. The press box of the finishing press is free to swing all the time and consequently pressing parts are prevented from touching each other.

5. As the charging cages are automatically shut up during the preliminary pressing the quantity of dregs is reduced to a minimum. Charging cages are automatically centred.

6. The filling cages are of light construction so that they can easily be removed.

7. The slightest charge caused by pressing is kept from the rollers of cages and pressure heads.

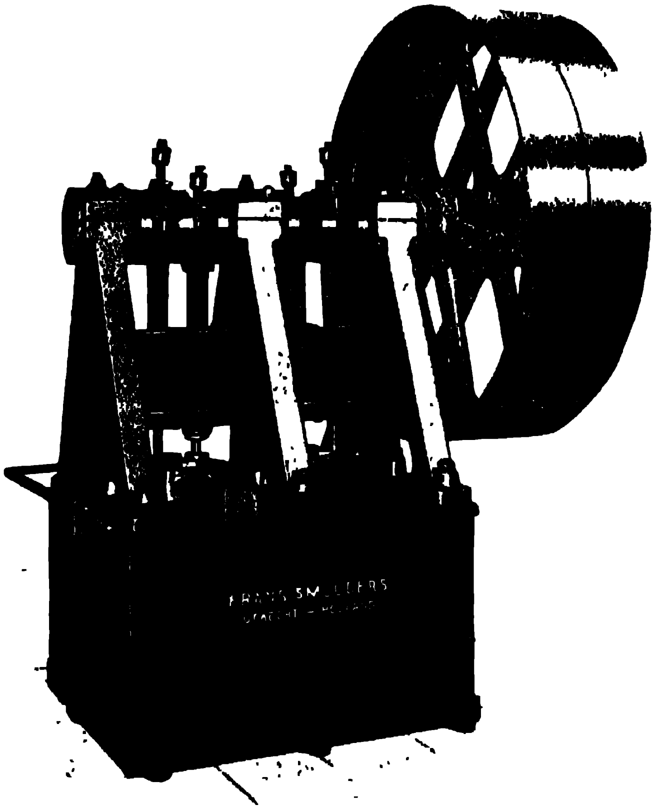
8. The press boxes can easily be cleaned and replaced, and leathers quickly and easily fitted.

9. The power consumption is low owing to the advantageous distribution of pressure liquid.

10. The space required is less and the foundation cellar need not be so deep as with Seiher plants.

Detailed specification and prices on application.

Hydraulic Pumps.



The Press Pump or Pumps are one of the most important parts of a successful oil well installation and much depends on their sound design and workmanship. Cheap pumps are only a source of financial loss.

The Pumps described here are suitable for other purposes as well as oil well installations and we shall be pleased to quote for press pumps for Jute, Cotton and other baling work.

The hydraulic Pumps are constructed with from 2 to 6 plungers, according to capacity required and space available.

The pump-plungers are automatically put out of action, either by means of a lifting device on the pump itself, or by means of the accumulators In the former case disengaging can be effected in two ways; by means of a so-called "direct action" pump or by fitting a maximum disengaging arrangement.

With the "direct-action pump' it is arranged that a low-pressure and a high-pressure plunger are coupled up to one press-supply. At first both plungers (high-and-low-pressure) work together until, on reaching the maximum of low-pressure, the low-pressure plunger is put out of action by a lever-mechanism, and the high-pressure plunger goes on working until the maximum high-pressure is reached, upon which this, too, is automatically put out of action. Should the pressure decrease, the plungers automatically operate again

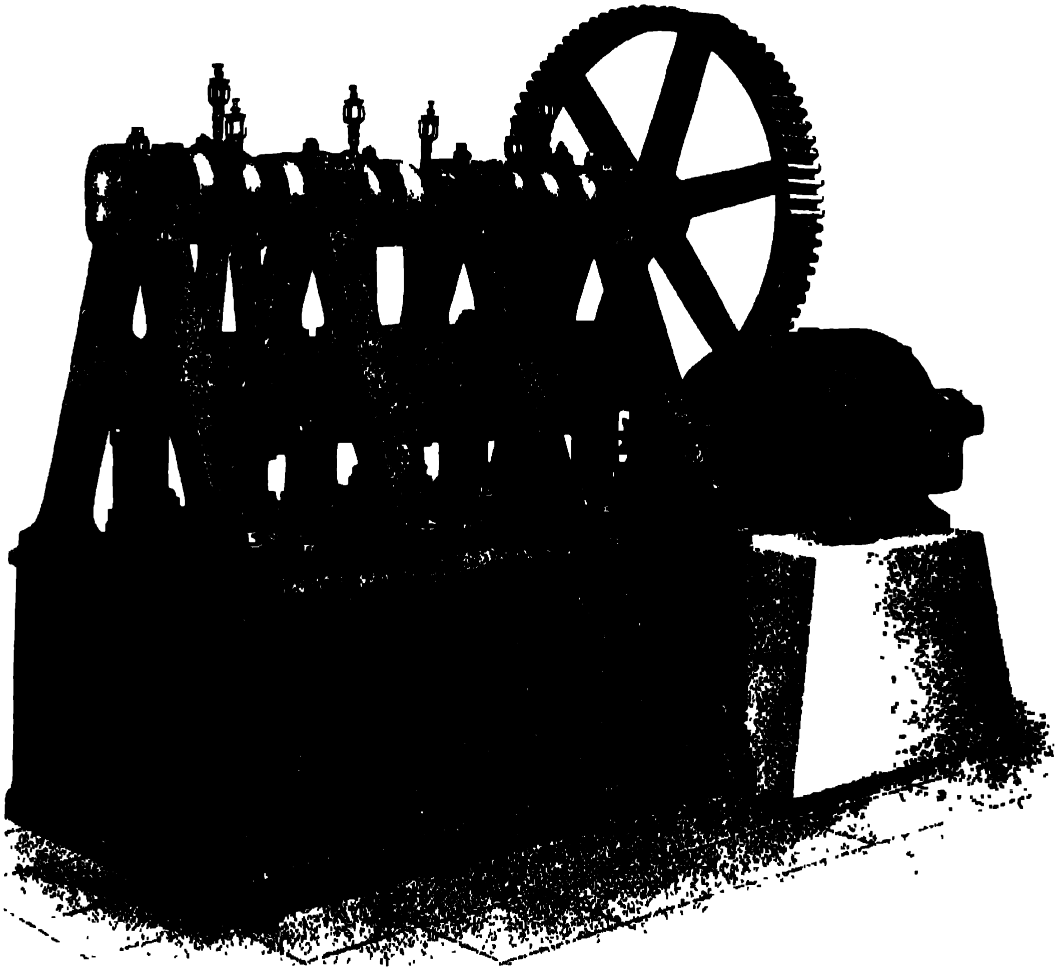
In the case of an accumulator pumping-plant, or pumps with maximum disengaging arrangement, the plungers work independently and are disengaged in and out by means of the accumulator concerned, or by a mechanism of weights and levers which work in connection with each plunger. In the first instance at the highest position of the accumulator, the plungers are put out of action, and to be engaged again as soon as the accumulator has sunk to a given point In the second case at the highest admissible pressure a mechanism for lifting the suction valves, comes into operation but releases as soon as the pressure falls.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hydraulic Pumps – Geared 6-Throw Types.



These pumps are solid and yet not too heavy. Every device has been adopted to get as much effective power out of the pumps as possible. The greatest possible care has been given to lubrication, so as to reduce the consumption of oil, and necessary attention to a minimum. The transmission of pressure to the plungers from the connecting-rod is effected by means of a crosshead, so that no lateral thrust operates upon the plunger; by this wear and tear is reduced to a minimum. The crosshead-guides form an immovable whole with the bearings, and at the same time serve to support same. The bearings, and connecting-rod big ends are adjustable. The pumping portion is made of one piece of forged steel.

The pressure and suction valves are easily accessible and detachable, while the pressure valve seat can be taken out separately. The whole is mounted on a cast-iron tank reservoir, which serves also as a bed-plate.

Two-Plunger	Pumps	from	1	in.	×3	ins.	to	2¾	ins.	×4½	ins.	capacities	from	½	to	11	galls.	per	min.
Three-Plunger	„	„	1½	ins.	×5	„	„	3	„	×5	„	„	„	5¼	„	18½	„	„	„
Four-Plunger	„	„	1	„	×3	„	„	2¾	„	×4¼	„	„	„	1	„	22	„	„	„
„	„	„	1½	„	×5	„	„	3	„	×5	„	„	„	7	„	24½	„	„	„
Six-Plunger	„	„	1	„	×3	„	„	2¾	„	×4½	„	„	„	1½	„	33	„	„	„

Full particulars and prices on application.

Cake Paring Machines.

Hydraulic and Mechanical.

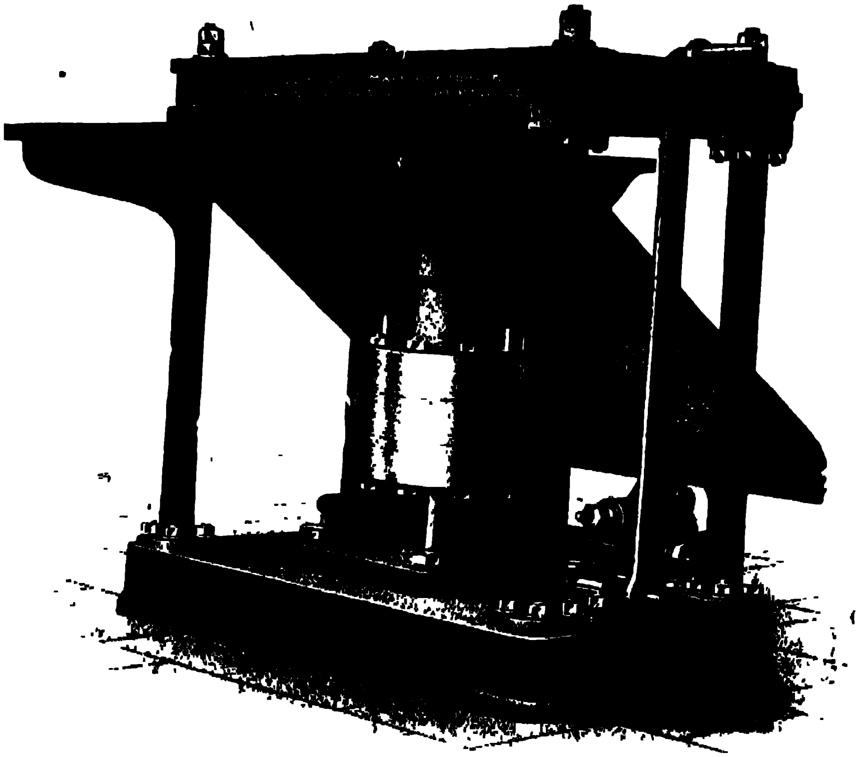


Fig. 1.

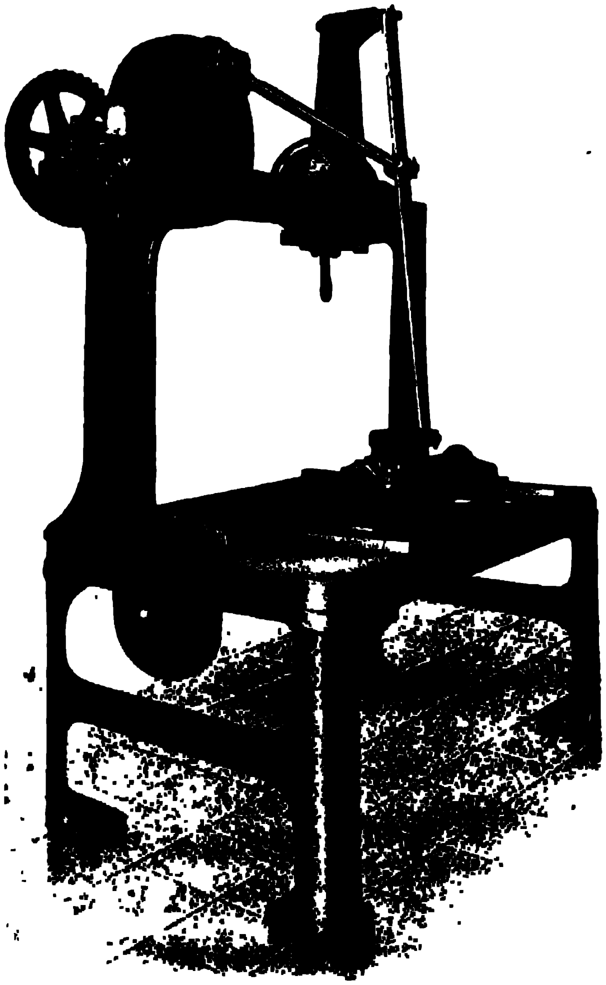


Fig. 2.

Both machines, as illustrated in Figs. 1 and 2, are employed for cutting off the greasy edges from the cakes. For this purpose the cakes, after the press cloth has been stripped off, are laid on the table of the machine.

Cake Paring Machines.

Hydraulic and Mechanical.

Hydraulic Cake Paring Machine.

Fig. 1 shows a machine constructed for a hydraulic pressure of 710 lbs. per square inch and adapted to cut off the four edges of the cake simultaneously. The cake is placed under the knife frame, which is arranged above the table and ram, and pressure is admitted.

The pressure liquid is admitted under the ram by a hydraulic stop valve which is easily controlled by hand. After the ram has been raised, the cake remains in the knife frame and is pushed out by following cakes above the level of this frame.

Ram Diam.	Working Pressure in lbs. per sq. in.	Capacity in Number of Cakes per hour.	Nett Weight in Cwts.	Space Required.			Price, Rs.
				Length	Width.	Height.	
3½ ins.	710	200		3 ft. 7¼ ins	2 ft. 10¼ ins.	3 ft. 7 ins.	**3,240**

Mechanical Cake Paring Machine.

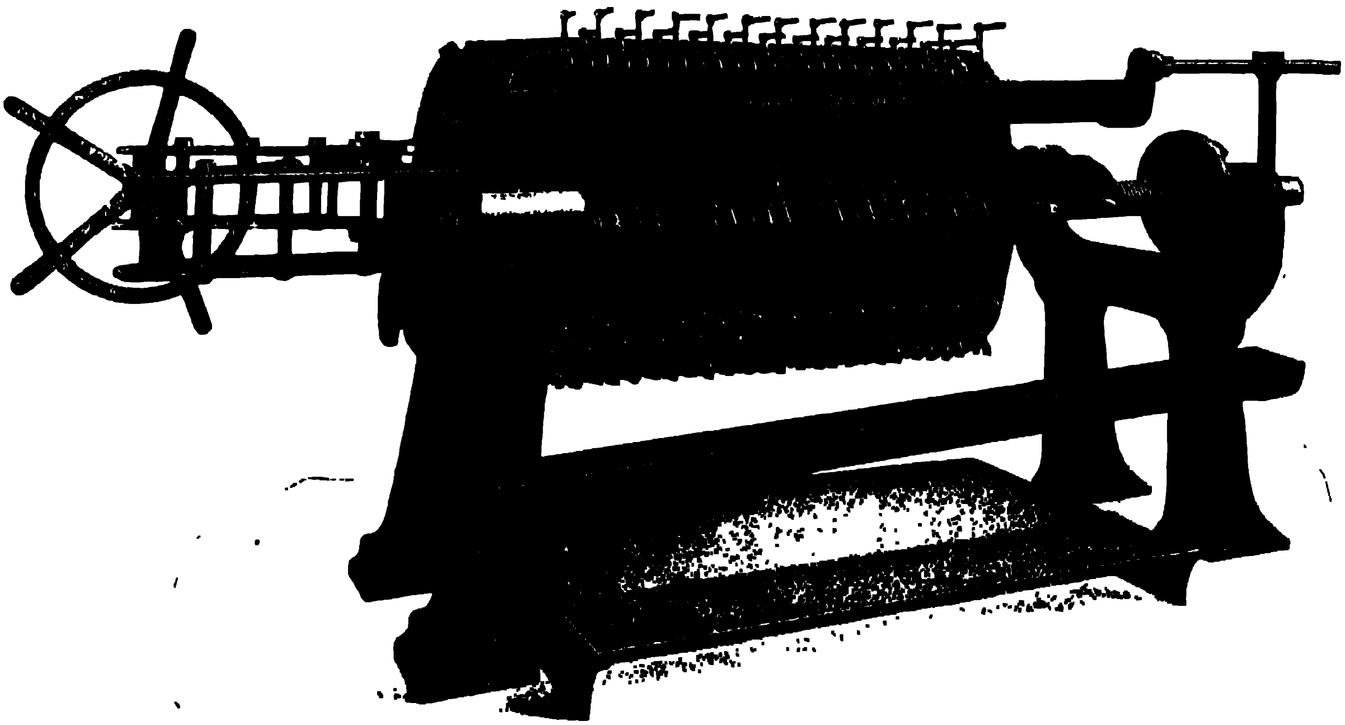
The machine shown in Fig. 2 is employed for cutting off the edges mechanically. The first mentioned machine in the table below is provided with a table of double size, which allows the paring of two cakes simultaneously on one side. A machine substantially similar to Fig. 2 and indicated by the lower one in the table, allows the paring of one cake at a time on one side The parings may easily be cut off to different thicknesses.

Driving Pulley.		R.P.M.	B.H.P.	Nett Weight in Cwts.	Space Required.			Price, Rs.
Diam.	Width.				Length.	Width.	Height	
11¾ ins.	4½ ins.	100	1	28	6 ft. 6¾ ins	3 ft 8½ ins.	8 ft. 5½ ins.	**2,258**
11¾ ,,	4½ ,,	100	1	25	6 ,, 6¾ ,,	3 ,, 0¾ ,,	8 ,, 5½ ,,	**On application.**

Further equipment for Oil Mills such as **Edge Runner Stones, Weighing Machines, Conveyors, Dust Collectors, Screening Apparatus, Magnetic Separators, Cake Crushers, Valves, Hydraulic Press Indicators, etc., etc.,** can be supplied to suit requirements.

Refining and Chemical Extraction Plants are further specialities of Messrs. Frans Smulders, for which we shall be pleased to quote.

Filter Presses.



To separate the more or less solid matter from oils or other fluids so that a bright clean extract is obtained, ready for immediate delivery, the fluid has to be filtered. In larger mills the Smulder's Filter Press—for either hot or cold filtration depending upon method of working—is used and in smaller mills a Dripsack Filter, both methods being preferable to the settling tank arrangement which is a very slow method and not so effective.

The closing device is not constructed for all presses in the same manner, but depends on the size of the press; Nos. 1 to 5 inclusive are fitted with a straight screw spindle, and Nos. 6 to 10 inclusive (as illustrated above) are fitted with a compound lever screw-spindle arrangement.

No.	Size of the Square Plates.	Number of Chambers.	Approximate Total Surface of the Plates in Feet.	Nett Weight in Cwts.	Space Required.			Price, Rs.
					Length.	Width	Height.	
1	2' 1"	12	107 6	40	6' 5"	3' 8"	4' 1"	**2,442**
2	2' 1"	18	161·6	49	7' 5"	3' 8"	4' 1"	**3,290**
3	2' 1"	24	215·4	58	8' 5"	3' 8"	4' 1"	**3,930**
4	2' 1"	30	269·3	67	9' 4"	3' 8"	4' 1"	**4,550**
5	2' 1"	36	323·1	75·5	10' 4"	3' 8"	4' 1"	**5,142**
6	2' 8"	24	323·1	98·5	11' 10"	4' 5"	5' 0"	**5,745**
7	2' 8"	30	409·3	113·5	12' 10"	4' 5"	5' 0"	**6,600**
8	2' 8"	36	495·4	128·5	13' 10"	4' 5"	5' 0"	**7,525**
9	2' 8"	42	581·6	143·5	14' 10"	4' 5"	5' 0"	**8,590**
10	2' 8"	50	689·3	163·5	16' 2"	4' 5"	5' 0"	**9,928**

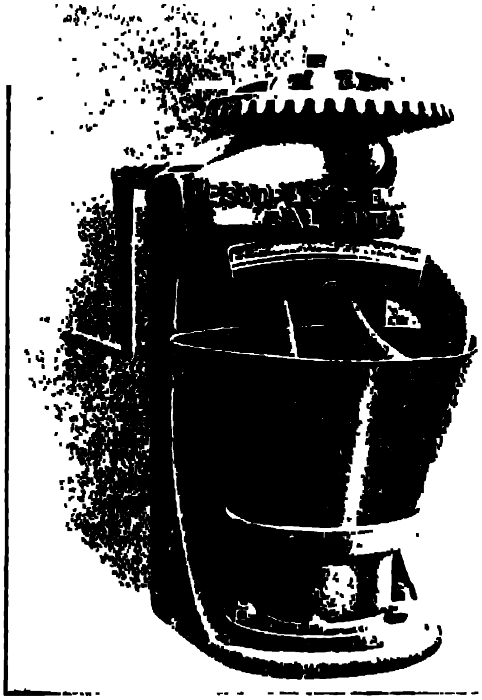
Filter cloth extra.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Donaldson's Patent Oil Mill.



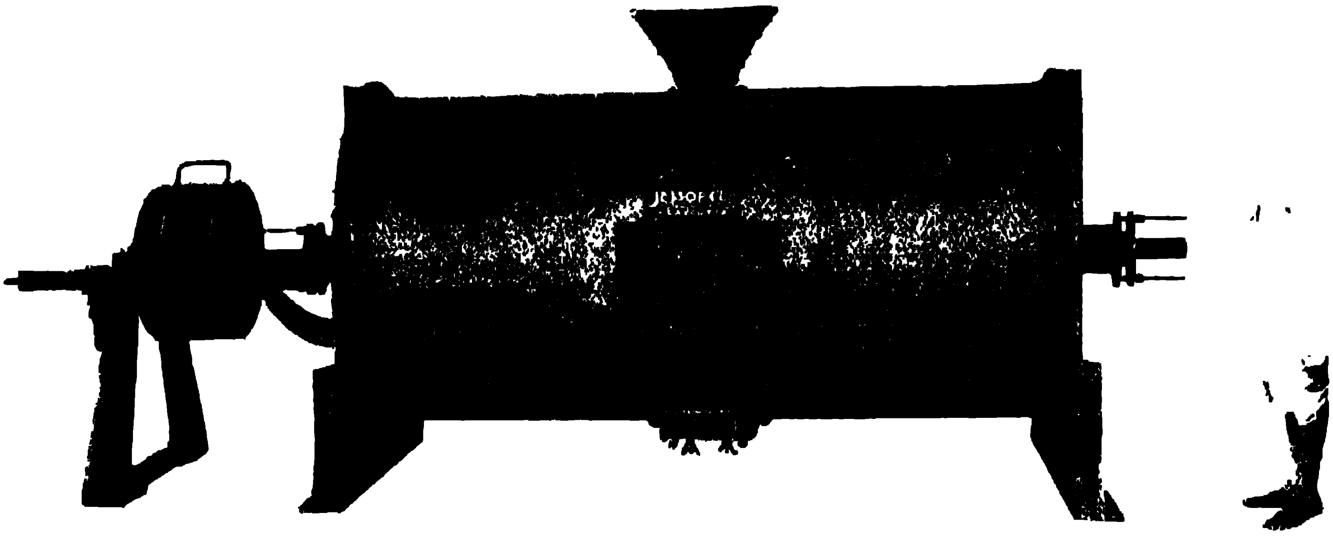
The Oil Mill generally used in this country is made of wood, and by the excessive grinding action is continually altering in shape, so much so that the heavy item of expenditure for upkeep and maintenance becomes a serious consideration. The want of an efficient substitute for the wooden mill has been met by the introduction of **Donaldson's Patent Oil Mills,** numbers of which are now in use and giving perfect satisfaction They can be worked by hand as single mills, or a number can be ranged together and driven by power.

Price of Mill, with Crank handle at back. **Rs. 250-0**

Price of Mill, with Crank handle at front. **Rs. 270-0**

For full description and instructions for erecting and working, write for special circular.

Shellac Washing Machines.



The illustration shows our Standard Lac Washing Machine, 4 feet diameter by 6 feet long with a working capacity of 20 to 25 maunds per day. It is supplied complete with fast and loose pulleys.

Prices on application.

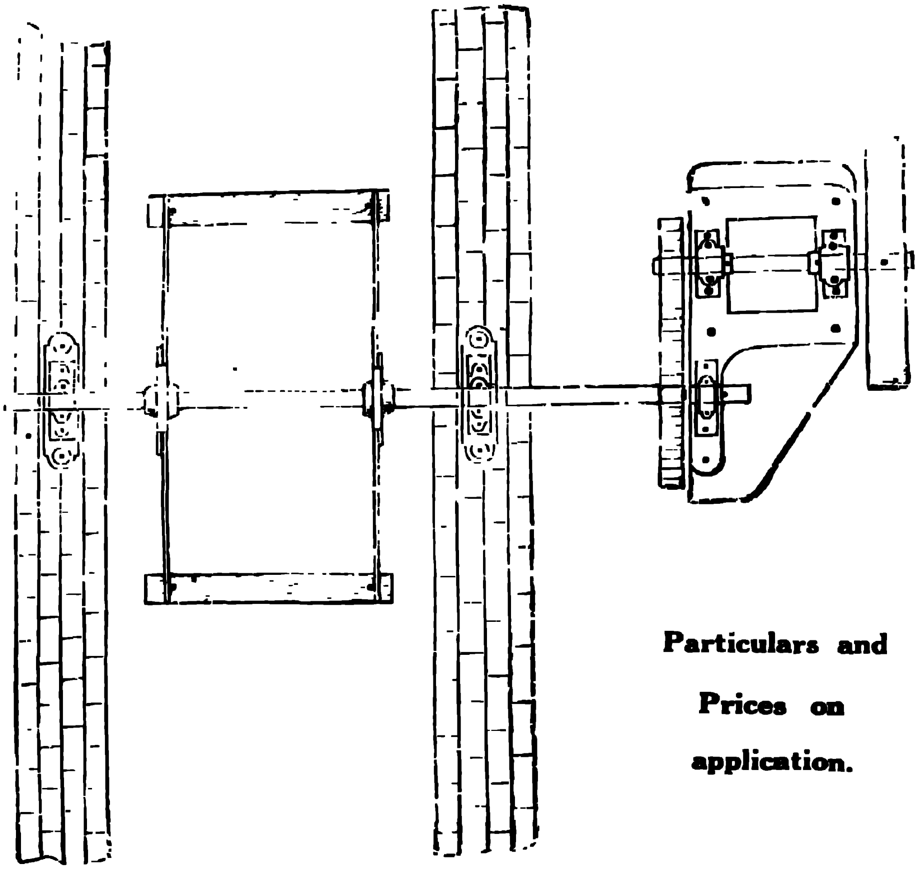
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Indigo Machinery.

Indigo Beating Gear.

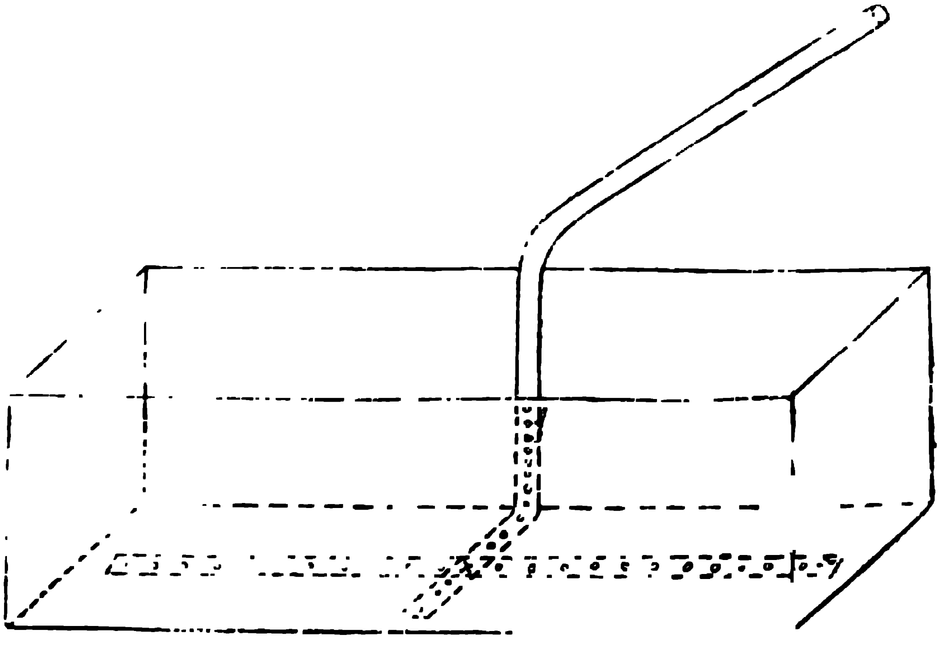


Particulars and Prices on application.

Indigo Boiler or Boiling Vat.

Tank plates are prepared ready for riveting up at site

Price, Rs. 25-0 per cwt



CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Indigo Machinery.

Indigo Mall Ejectors.

These ejectors are used for forcing water and other liquids (cold or hot, up to 190° Fah.) from 2 to 25 feet high from tanks, boilers, vats, etc. They are very suitable for raising Indigo Mall from the beating vats to the boilers.

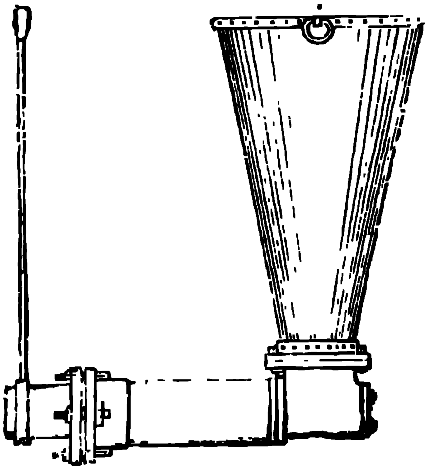
When working they must be completely immersed.

No.	Gallons per Hour.	Size of Delivery	Size of Suction	Price.
10	890	1¼ ins		**Rs. 84-0**
12	1,200	1½ ,,	¾ ,,	**,, 106-0**
15	2,140	2 ,,	1 ,,	**,, 144-0**
20	3,560		1¼ ins	**,, 210-0**

Indigo Vat Valve.

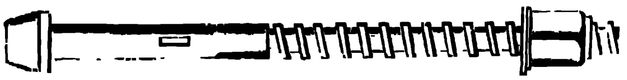
Size, Ins. 5	**Price, Rs. 60-0** each.
,, ,, 6	**,, ,, 70-0** ..
.. .. 7	**80-0**

Indigo Vat Drainer.



Size, Ins. 3	**Price, Rs. 120-0** each.
,, 4	**144-0**
	160-0
.. 6	**192-0**
,, 7	**216-0**
,, 8	**240-0**

Indigo Screws.



W. I., 4 ft. long by 2½ ins. with W. I. nuts to suit, with W. I. collars and keys complete	**Rs. 130-0** each.
,, 4′×3″	**,, 150-0** ,,
. 5′×3″	**,, 160-0** ,,
,, 6′×3″	**170-0**
,, 7′×3½″	**,, 210-0**
Any of the above with G. M. nuts	**Rs. 90-0** each extra.

Prices for other sizes on application.

Wrought Iron Handles for Indigo Screws	.. **Rs. 56-0** per cwt.
W. I. Nuts for 3 inch Indigo Screws, Rough	. **,, 33-0** each
W. I. Nuts for 3 inch Indigo Screws, machined	.. **,, 47-0** ,,
G. M. Nuts for 3 inch Indigo Screws, Rough	.. **,, 3-0** per lb.
G. M. Nuts for 3 inch Indigo Screws, machined	.. **,, 4-0** ,,

Prices for other sizes on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & CO. LTD.
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ice Making and Cold Storage Plant.

We shall be pleased to quote and supply detailed specification for both large and small Ice making plants and for Refrigerating machinery for making Ice or providing Cold storage, on the Ammonia system.

We have during the past 15 years supplied complete equipment for a number of Ice Factories and the machinery which we offer, made by Messrs. L. Sterne & Co. of Glasgow, has an established reputation in India and Burma.

We offer Ice Plants working on the Ammonia system as this is almost universally used for land installations and is generally admitted to be the best system to adopt.

The disadvantage of other systems is that either very high pressures have to be used—in which case special difficulties arise in preventing leakage—or pressures below atmospheric conditions which make leakage difficult to detect. The fact that Ammonia is a pungent chemical is a safeguard against leakage as it is instantly apparent if any of the gas passes through a leaking joint.

The conditions under which Ice Plants have to work and the local market conditions have made it difficult to offer a standard equipment which will suit every case and it is advisable for enquirers to give us the fullest possible information to enable us to prepare suitable estimates.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ice Making and Cold Storage Plant.

The method of driving, whether by belt from Electric Motor, Oil or Gas Engines, or a Compressor directly coupled to a Steam Engine should be decided upon first, as the method of driving largely affects the cost of operating the plant. There are numbers of accessories supplied with Ice Plants, some of which are necessary on large plants and can be dispensed with on smaller ones, such as cranes for lifting ice blocks out of the freezing tank, special arrangements for thawing and tipping the ice cans, arrangements for filling the cans, the supply of pure distilled water, etc., all of which make considerable differences to the price of a plant—differences which ought to be considered when comparing prices of different offers put forward.

Two further factors which largely affect the initial cost have also to be considered.

(1) The thickness of the Ice required to be made.

The time required for freezing is naturally considerably higher when the market demand is for thick blocks of Ice, and consequently the actual capacity of the ice tank, and the number of cans have to be considerably more for making thick Ice. No comparison of prices is, therefore, possible unless all the specifications and estimates are for making Ice of the same thickness.

(2) The usual market demand is for clear or crystal Ice, and to obtain this, it is either necessary to include a distilling plant to purify the water before freezing, or else to employ some form of agitation to the water in the ice cans, while freezing is in process.

We can offer either type of plant and the Sterne System of air agitation, by introducing compressed air from the bottom of the ice cans produces the finest crystal Ice. If however opaque Ice will satisfy a local market, the cost of ice plant can be considerably reduced by the elimination of the air compressor or blower and agitating arrangements.

Ice Tanks.—In small plants it is sometimes cheaper for the buyer to provide for an ice tank made of well-seasoned wood bolted and well caulked with Bitumen at the joints. For large plants, tanks made of mild steel plates are used, and it is of great value to the buyer to stipulate that the thickness of plates should be ample, and that the tank should be fitted up before despatch so that it can be readily assembled at site.

Ammonia Pipe Work.—All pipe work supplied should be made to the exact size required for fitting into a buyer's factory and all the flanges should be welded on to the pipes and tested before despatch. It is not an uncommon practice for some firms to supply piping in straight lengths to be bent at site and to be fitted with connecting flanges where required. This gives a good deal of extra work to the buyer and is liable to result in leaky joints and the loss of Ammonia. *Unless the pipe work is of the very best quality it is a constant source of trouble and loss to the owner of the factory.*

Suitable arrangements should always be provided to enable the Ammonia to be pumped out of the pipe work system at the end of each season or at any other time which may be necessary. This means the provision of several extra special Ammonia valves and naturally makes the equipment somewhat more expensive than one that does not give the same facilities.

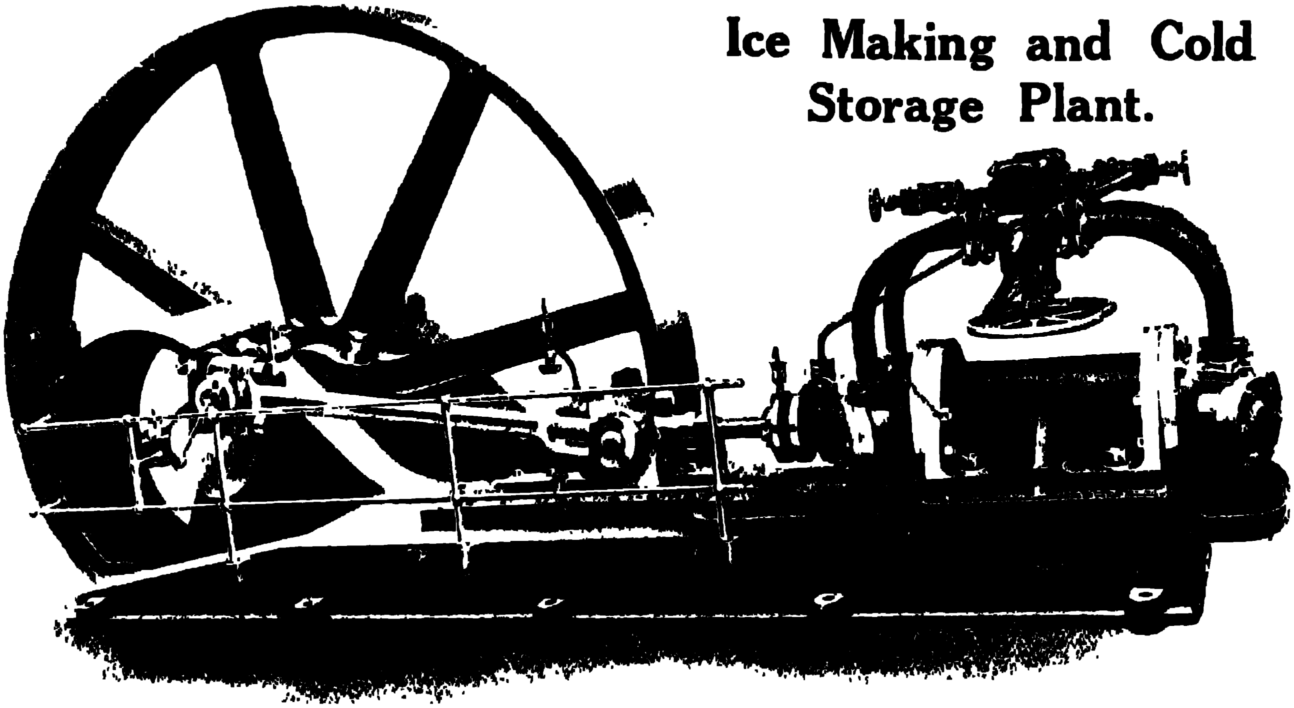
Insulation and Wood Work.—The economical working of an ice plant depends very largely on the insulation supplied and the care taken to prevent heat getting into the ice tank We can supply all necessary insulation if required and with every plant drawings are supplied showing how the wood frame for enclosing the Ice Plant can be made up. Usually this can be made cheaper at site.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

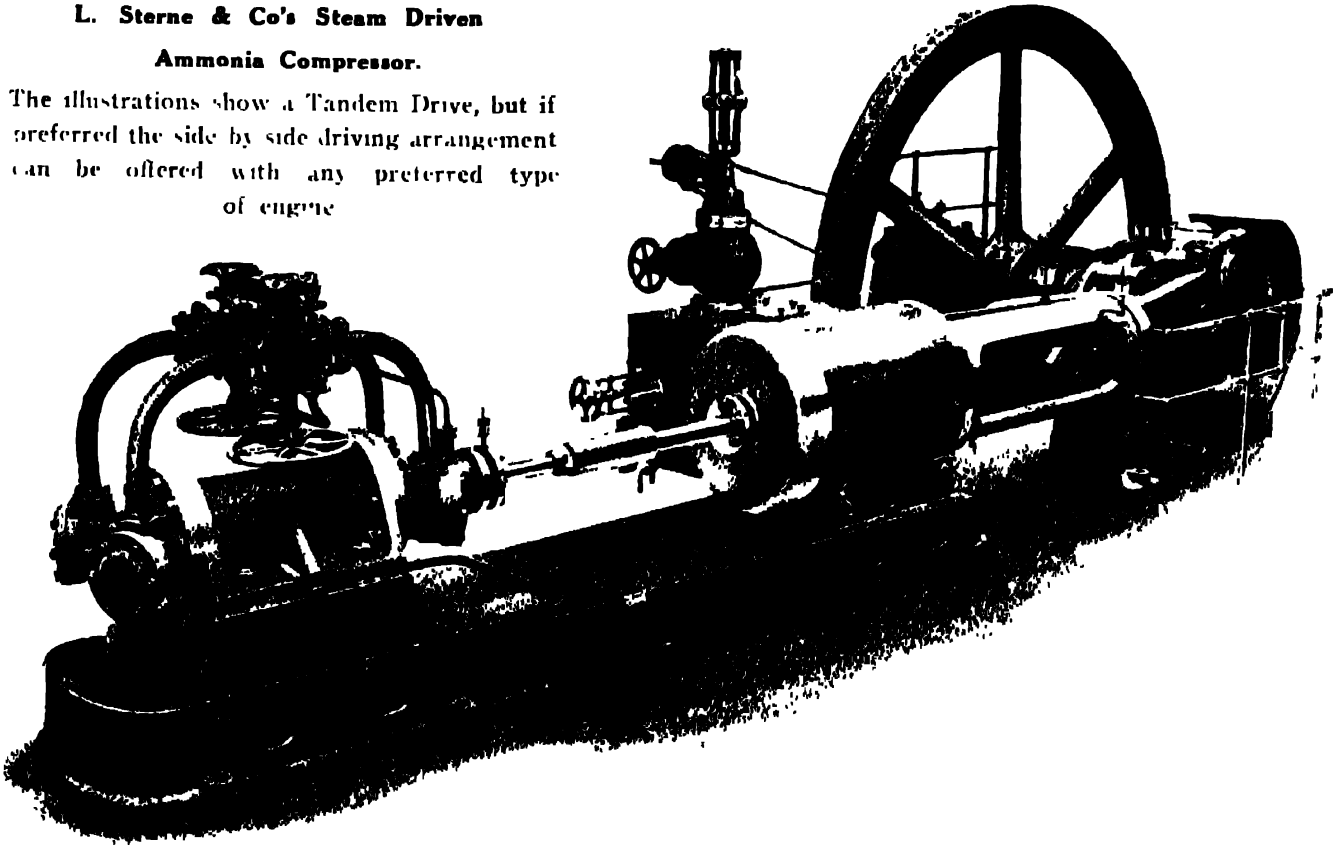
Ice Making and Cold Storage Plant.



L. Sterne & Co.'s Belt Driven Ammonia Compressor

L. Sterne & Co's Steam Driven Ammonia Compressor.

The illustrations show a Tandem Drive, but if preferred the side by side driving arrangement can be offered with any preferred type of engine



Ice Making and Cold Storage Plant.

Particulars required to enable Quotations to be made:-

(1) State whether clear or opaque ice is required

(2) State minimum thickness of ice which is desired to be made and approximate weight of ice blocks which are most convenient

(3) State whether it is desired to lift out the cans singly or in rows of several at a time

In the former case, ice blocks up to about one maund in weight can be lifted by two men and in the latter case it is usual to lift up one row of ice cans at a time using hand travelling cranes for the purpose.

(4) State whether thawing tank and tipping gear is necessary for unfreezing the ice in the can and for mechanically tipping it out on to the floor of the ice room These accessories are generally considered to be essential when ice cans are lifted in rows

(5) Is a supply of pure water available to make the ice from?.

The water should be such as would meet the approval of the Local Health Authorities and if not obtainable it will be necessary either to filter what water can be obtained or else to use a Distilling Plant.

(6) State whether an abundant supply of water (not necessarily pure) is available for cooling the Condenser

The location of the water relative to the Engine Room should be given, and it should be stated whether it is necessary to supply a pump for raising the water to the top of the Condenser

The quantity of water necessary for Indian conditions of working may be approximately gauged by taking 120 gallons of cooling water per hour for every ton of ice manufactured per day If the water supply is inadequate the same water may be used repeatedly with only a small quantity for "make-up" by installing a "Heenan" Mechanical Water Cooler as described on pages 532/3 of this catalogue

Other Systems.—Ice can also be made in the "Cell" and "Plate" Systems but the "Can" system is universally used for all small and moderate sized ice plants

It should be particularly noted in comparing capacities of different makes of ice plants offered that ice plants are frequently rated on the American ton of refrigeration, which is 2,000 lbs weight per ton nstead of 2,240 lbs. which represents a British ton A 10 ton ice plant (American rating) will therefore have a capacity of only 9 tons actual ice produced

Prices of Standard Ice Plants for making clear Ice with vertical compressors.

Ice Making Plant Capacity per day 24 hours	15 Cwt	1½ Tons.	3 Tons.	6 Tons	10 Tons	15 Tons	20 Tons
Thickness of Ice made . ins	4	6	6	6	9	9	9
Weight of each block . lbs	56	112	112	112	225	225	225
B.H.P. recommended	4	9	16	27	50	75	100
Price for Belt Driven Plant .. **Rs.**	5,900	10,800	15,900	25,400	49,500	73,000	84,000
Price for Steam Driven Plant (exclusive of Boiler) **Rs.**	.	..	..	..	57,000	82,000	1,04,000

Detailed Specifications of Plants on application.

Ploughs and Implements for Indian Conditions.

As agents in India for the production of Ransomes, Sims and Jefferies, Ltd., Ipswich, England, who have a worldwide reputation for implements of all kinds, we are able to offer a large range of high-class ploughs suitable for all classes of work in India.

Although the invention of the patent cast chilled "self-sharpening" Ploughshare, double-furrow and multiple ploughs, of which Messrs. Ransomes, Sims and Jefferies, Ltd., are pioneers, goes back 100 years or more, it was not until the introduction of the "Jefferies" patent double-wheel lifting apparatus that it was possible to bring these valuable labour-saving implements into general use.

The Disc Plough is now established as the perfect implement for ploughing land, free from stones, which have been baked hard by the sun

The prices of Ploughs made from special materials, with shares, etc., made of special chilled iron or high quality steel is necessarily higher than that of similar types of country made ploughs. Price is, however, a relative figure and must be taken in conjunction with the life of an implement. A trial will convince users that the high class implement is the cheapest in the long run and outlasts those of other types.

It is impossible to show in this Catalogue all the Ploughs which Ransomes, Sims and Jefferies, Ltd., manufacture, but they are in a position to supply Ploughs and Implements to suit different soils and varying conditions, and on receipt of particulars we will be pleased to quote for what is suitable.

The statements of dimensions, weights and measures, and of the working capacity of the ploughs and implements described in this catalogue must be considered as approximate and not absolute.

The statements contained in this catalogue respecting the various drought of the ploughs must be taken as comparative, the actual draught required varying according to the condition of the soil at the time of ploughing, and the size of the animals and method of harnessing.

The illustrations and descriptions are intended to serve as a general guide, but they are not binding as to details, which sometimes vary in the different sizes.

The prices given in this list are for single implements. For large quantities we shall always be pleased to quote special rates.

Spare Parts. We carry a very large stock of replacement parts for Ransomes' Implements and shall be pleased to send separate sheets to buyers to enable them to identify and order parts required from time to time.

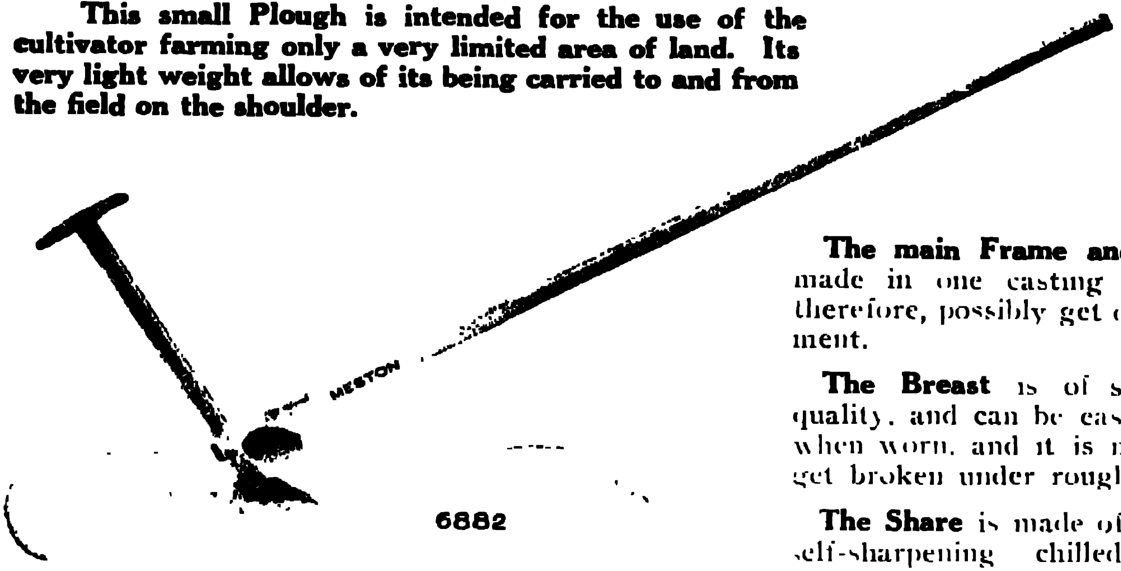
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' "Meston" Plough (M.S.N.)

This small Plough is intended for the use of the cultivator farming only a very limited area of land. Its very light weight allows of its being carried to and from the field on the shoulder.



6882

The main Frame and Slade are made in one casting and cannot, therefore, possibly get out of alignment.

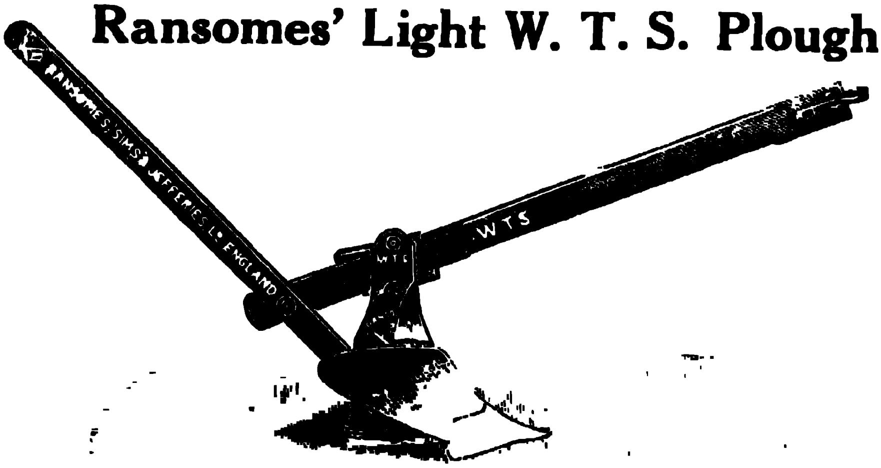
The Breast is of steel of high quality, and can be easily renewed when worn, and it is not liable to get broken under rough use

The Share is made of Ransomes' self-sharpening chilled material, and is firmly bolted to the frame; this material gives exceedingly long wear in work Thousands of these ploughs are every year put into commission in India.

The Share for this Plough is marked 625 and the Breast 1191.

Mark.	Size of Furrow in inches.	Average weight, complete.	Average Weight of Iron-work only	Approx. Draught
M.S.N.	3 to 5 deep×5 to 7 wide	34 lbs	16 lbs	2 small bullocks.
Price, per set of Iron-work ..	..	..		Rs. 12-0
Extra Shares, each ..	..	..	. . ..	„ 1-4

Ransomes' Light W. T. S. Plough.


RANSOMES SIMS & JEFFERIES LD ENGLAND
W T S
W T S

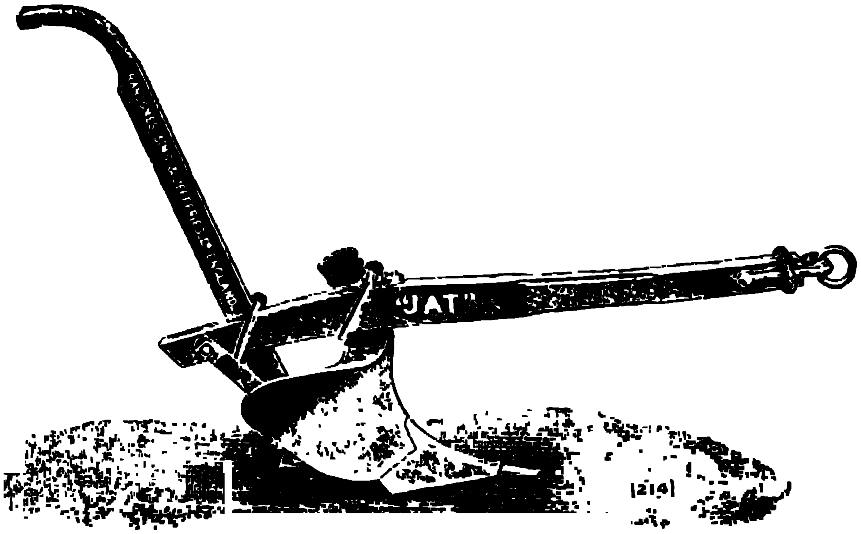
This is a small Plough intended for the use of Indian cultivators and is very popular in the United Provinces.

The Share and Breast are of Ransomes' self-sharpening chilled material. The complete Plough, as shown above, is equipped with a wooden handle and wooden beam, to the head of which a hake is attached. If specially ordered, **a pole** can be supplied in place of the beam, and the end of this can be fastened direct to the yoke of the oxen. It can be supplied either with or without the woodwork.

The Share is marked 601 and the Breast 1180.

Mark.	Size of Furrow in inches.	Average Weight.	Average Weight of Iron-work only.	Draught.
W.T.S.	3 to 6 deep×5 to 8 wide	48 lbs.	37 lbs.	2 small bullocks.
Price, per set of Iron-work	.. ..	..	.. .. ..	Rs. 12-0
Extra Shares, each..	.. ..	..	.. .. ..	„ 1-8

Ransomes' "Jat" Plough.



(214)

The "Jat" Plough illustrated here embodies many attractive features for the small cultivator and is particularly suitable for ploughing alluvial and other soils, with two small bullocks.

The Set of the Beam, which is made adaptable to the method of yoking Indian bullocks, helps to make the Plough light and easy to handle in work. **The Breast,** which is highly polished to reduce the friction of the earth to a minimum, is of suitable shape to produce a well turned furrow.

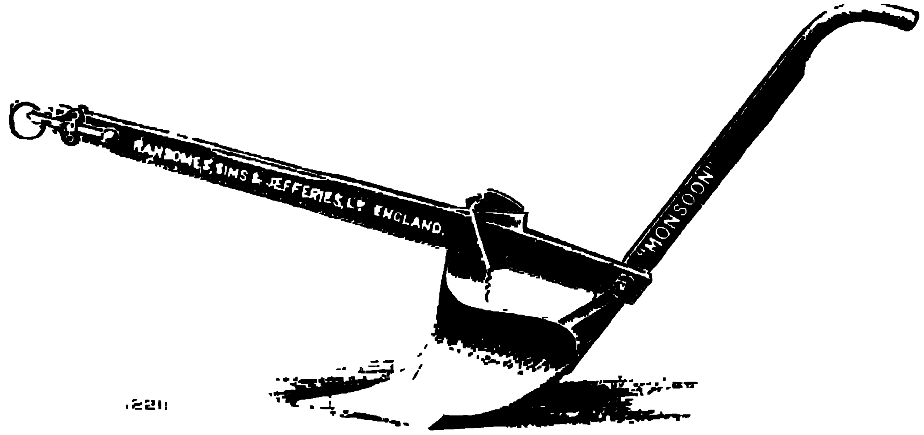
The Share is made of Ransomes' self-sharpening chilled metal, with a renewable chilled point, and is ground and polished to prevent the earth from sticking

The "Jat" Plough can be arranged either for **a short beam** as shown in the illustration, or for **a long beam**, according to instructions

The Shares for this Plough are marked "Vitis D" and the Point **173.**

Mark	Size of Furrow in inches	Average Weight, complete	Average Weight of Iron-work	Approx. Draught
"JAT"	**3** to **6** deep **5** to **8** wide	**48** lbs.	**37** lbs.	**2** small bullocks.
Price, per set of Iron-work	.	.. .	.. .. ..	**Rs. 26-0**
Extra Shares, each	..	.. ..	.. .. ..	,, **2-0**
,, Points ..	..	. ..	.. .. ..	,, **0-12**

Ransomes' "Monsoon" Plough.



(221)

The "Monsoon" Plough is similar in every respect to the "Jat" Plough described above, **but turns a furrow to the left** instead of to the right. It is thus adapted to the Indian custom of ploughing, and is an extremely popular implement.

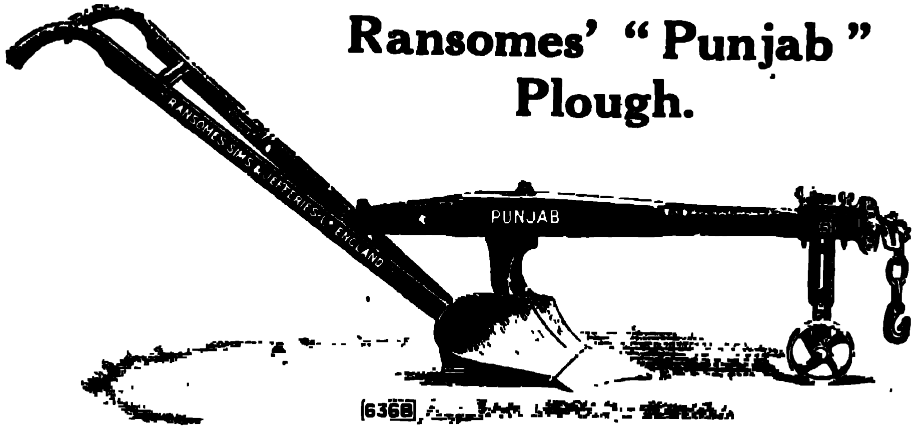
The Share is marked "Monsoon" and the renewable Point is marked **173.**

Mark	Size of Furrow in inches.	Average Weight, complete.	Average Weight of Iron-work.	Approx. Draught.
"MONSOON"	**3** to **6** deep **5** to **8** wide	**48** lbs.	**37** lbs.	**2** small bullocks
Price, per set of Iron-work	..	.		**Rs. 26-0**
Extra Shares, each	. ..	.. ..		,, **2-0**
,, Points	. ..	.. ..		,, **0-12**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.


RANSOMES SIMS & JEFFERIES L° ENGLAND
PUNJAB
[6368]

Ransomes' "Punjab" Plough.

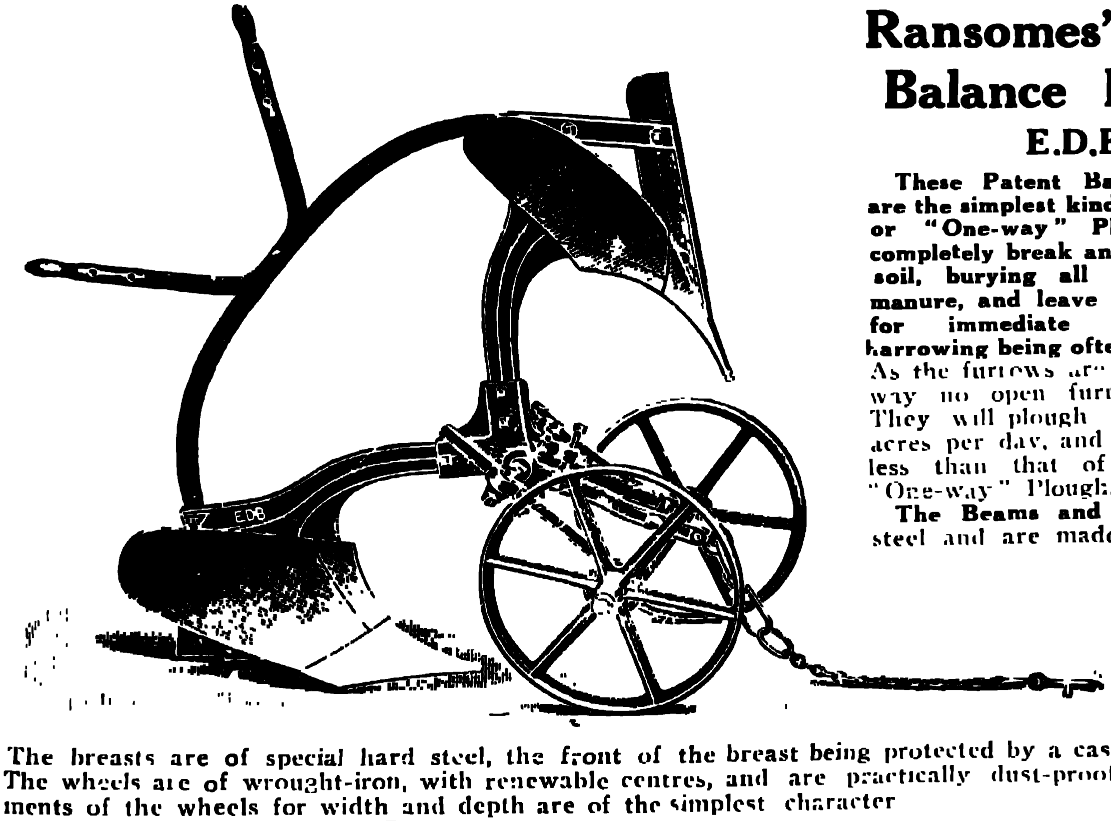
This light chilled Plough is fitted with a wooden beam and two wooden handles. The plough-body which is bolted direct to the beam, has a sloping landside—a useful feature for ploughing certain classes of soil. The breast is of cast chilled material.

The set of the beam can be easily regulated sideways by a simple arrangement at its handle end. The beam-head is provided with an improved vertical adjustment for draught, and also with a hake allowing ample lateral adjustment

The implement can be supplied complete, or, if preferred, the iron-work only with bolts can be sent

The Shares for this Plough, which are of self-sharpening cast chilled material, are marked A.C.P and the renewable points 192.

Mark	Size of Furrow in inches.	Average Weight. complete.	Average Weight of Iron-work	Approx Draught
"PUNJAB"	**3** to **6** deep × **6** to **8** wide.	**64** lbs	**50** lbs	**2** small bullocks.
Price, complete				Rs. **56-0**
Iron-work only				„ **36-0**
Extra Shares, each				„ **2-8**
„ Points				**0-12**



Ransomes' Light Balance Plough.

E.D.B.

These Patent Balance Ploughs are the simplest kind of Turnwrest, or "One-way" Ploughs. They completely break and pulverize the soil, burying all the weeds or manure, and leave the land ready for immediate sowing, even harrowing being often unnecessary. As the furrows are all turned one way no open furrows are left They will plough from 1¼ to 1½ acres per day, and the draught is less than that of the ordinary "One-way" Plough.

The Beams and Skifes are of steel and are made in one piece.

The breasts are of special hard steel, the front of the breast being protected by a cast chilled cutter The wheels are of wrought-iron, with renewable centres, and are practically dust-proof The adjustments of the wheels for width and depth are of the simplest character

The Shares are marked E.D.B.

Mark.	Size of Furrow in inches.	Average Weight	Draught.
E.D.B.	**5** to **8** deep × **9** to **12** wide.	**280** lbs	**4** to **6** horses or bullocks.
Price, complete			Rs. **200-0**
Extra Shares			„ **5-0**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' "Sabul" Plough.

S.B.P.

The Plough is specially suitable for ploughing land on which a hard dry crust forms in the dry season, but it is also well adapted for general purpose ploughing in most soils.

An important feature of the "Sabul" Plough is that it is equipped with a share having a **renewable and adjustable bar point** made from a specially prepared high carbon steel The steel bar being sharpened at both ends and reversible, the wearing point can be easily changed end for end, and when both ends of the steel bar are worn blunt it can be readily removed, heated and drawn out.

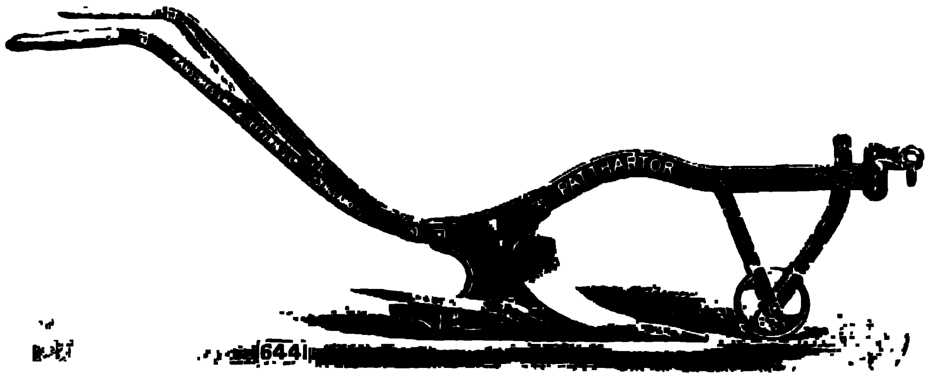
The "Sabul" can be fitted, if required, with a **knife coulter** at a small extra cost.

The Share for the "Sabul" is marked S.B.P.

Mark.	Size of Furrow in inches.	Average Weight.	Draught.
"**SABUL**" (1 wheel)	3 to 7 deep×6 to 10 wide.	145 lbs.	2 to 4 bullocks.
Price, complete ..			Rs. 96-0
Extra Shares, each ..			„ 6-8
„ Steel Bar, each			„ 7-0

Ransomes' "Patthartor" Plough.

This Plough, with the exception of the handle grips, is made entirely of steel. Like the "Sabul" Plough described above it is specially made for breaking up the hard-crusted Indian soils during the winter months with two small Indian bullocks.



Its exceedingly light draught is due to its special design, which permits a narrow furrow slice being cut and not actually turned over, but well broken up and pushed aside.

The Plough is provided with **an adjustable and reversible steel bar point** held in position by a wedge, no ordinary share being required **The pitch** of the point can be regulated as desired.

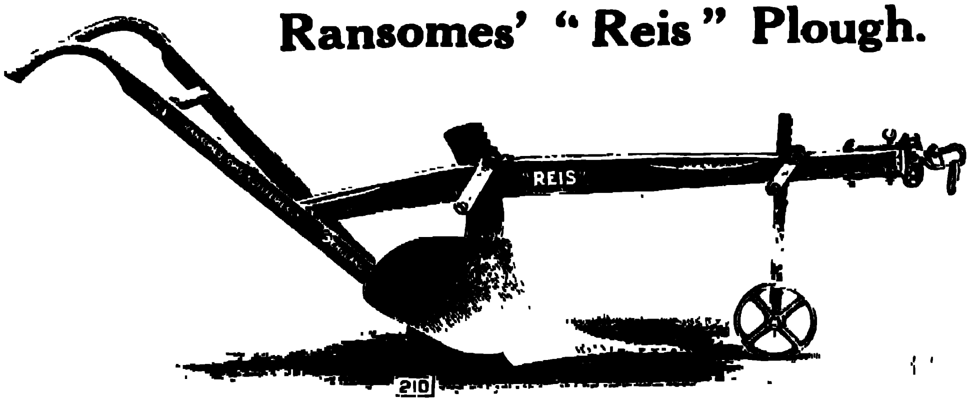
Mark	Size of Furrow in inches.	Average Weight.	Approx. Draught.
"**PATTHARTOR**"	3 to 6 deep×3 to 6 wide.	134 lbs.	2 small bullocks.
Price, complete			Rs. 88-0
Extra Steel Bar, each			„ 7-0

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' "Reis" Plough.



This Plough is designed for deep ploughing in light, easy working soils and can be used for making trenches for sugar cultivation and similar purposes.

The Beam and Handles are of seasoned wood suitable for use in hot climates, while **the body** is of cast-steel. **The slade** is separate from the body and can be easily removed when necessary. **The breast** is of Ransomes' special chilled steel.

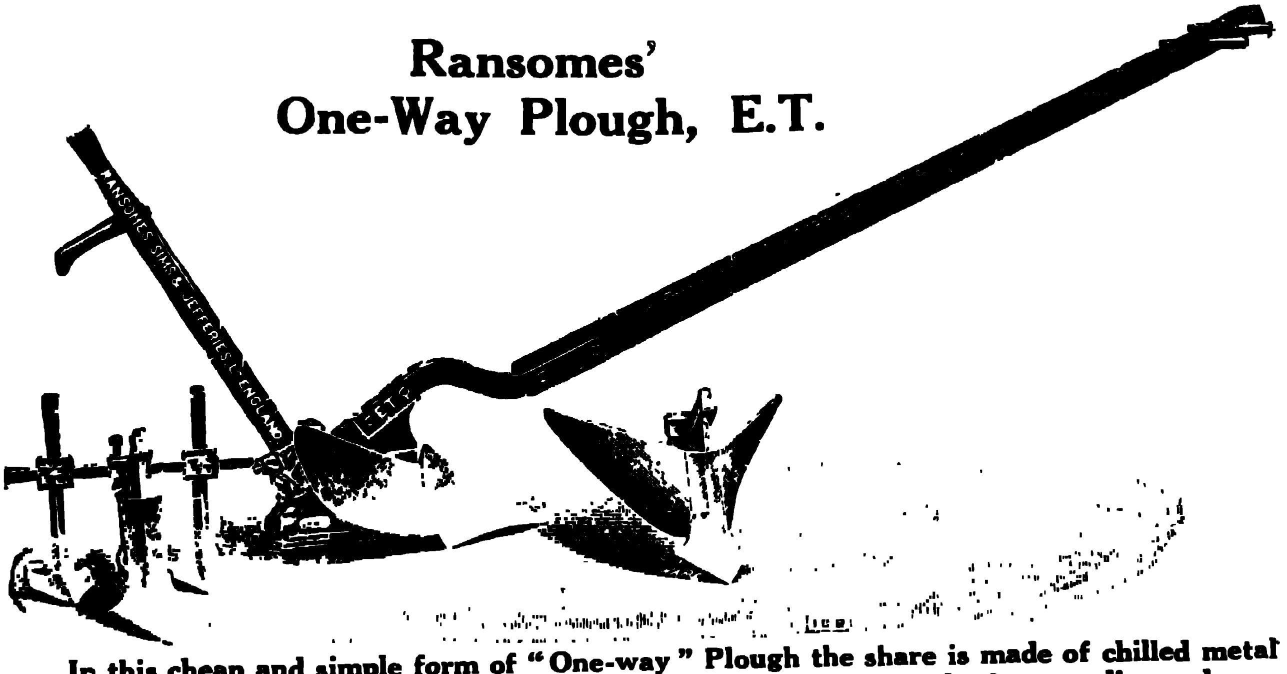
The Share, which is of cast-iron, is made to take a renewable cast chilled point which can be reversed, and renewed at a very small cost when worn, thus prolonging the life of the share.

The Shares for this Plough are marked D.C.P.

Mark.	Size of Furrow in inches	Average Weight	Approx. Draught.
"REIS"	4 to 7 deep×6 to 9 wide	81 lbs	2 to 4 medium bullocks 2 large bullocks.

Price, complete	Rs 65-0
Extra Shares	.. 3-8

Ransomes' One-Way Plough, E.T.



RANSOMES SIMS & JEFFERIES L.ᵀᴰ ENGLAND
E.T.

In this cheap and simple form of "One-way" Plough the share is made of chilled metal and is provided with a double wing, which serves alternately to cut the furrow slice and as a coulter.

The Breast is made of polished steel. The share and breast are hinged to the frame: at the headlands they are turned over to the opposite side of the beam and are held in position by a hook. The pole can be adjusted to suit the size of the oxen or depth of the work required. Extra parts, as shown above, to convert the plough into a ridging or hoeing plough can be supplied at extra cost and easily substituted in place of the ordinary breast and share.

Mark.	Size of Furrow in inches.	Average Weight, complete.	Average Weight, of Iron-work	Draught.
E.T.	5 to 9 deep×9 to 12 wide.	125 lbs.	84 lbs.	2 bullocks.

Price, complete	Rs 93-0

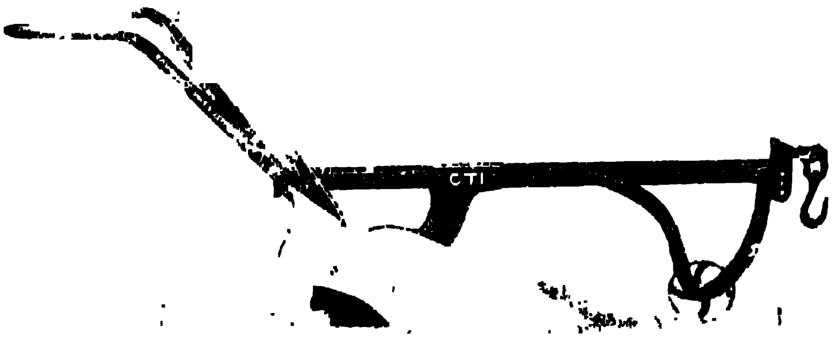
CALCUTTA, JAMSHEDPUR,
DELHI LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' New Turnwrest Plough, C.T.I.

This Turnwrest or "One-way" Plough, which lays all the furrows one way and leaves the land perfectly level, is suitable for general purpose "One-way" ploughing in nearly all soils when in a reasonable ploughing condition. It is also well adapted for ploughing hill-sides, where on account of the slope it is necessary to turn all the furrows downhill.



When Turning the Plough at the ends, the hook at the back end of the breast is released, and the share and breast allowed to swing under the frame of the Plough into position for turning the next furrow against the previous one.

The Depth of Ploughing is regulated by the position of the wheel in the front of the Plough, which is easily lifted up or depressed according as circumstances require.

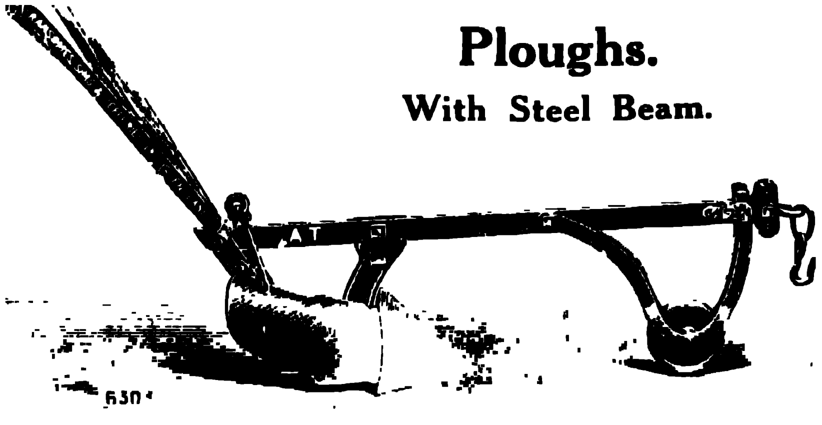
The Plough is supplied with **solid cast chilled shares,** but shares with renewable points which will be found more economical can be supplied if specially ordered

This Plough can also be fitted with steel breasts and wrought-steel shares at an extra charge if specially ordered.

Mark	Size of Furrow in inches.	Average Weight	Draught.		
C.T.I.	**6** deep × **10** wide	.. **160** lbs	.. **4** to **6** bullocks.	**Price,** complete **Rs.**	**92**
C.T.R. similar to C.T.I., but with wood beam and handles				,, ,, ,,	**82**

Ransomes' Turnwrest Ploughs.

With Steel Beam.



These Ploughs are constructed on the same general lines as the C.T.I. Plough described above, and are adapted for the same class of work. The shares, which are usually of cast chilled material, bear the same marks as the Ploughs.

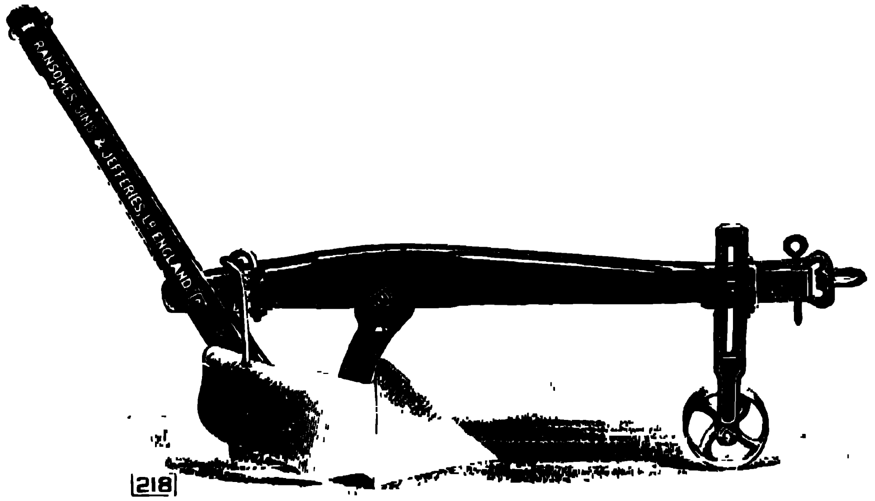
The A.T., B.T. and D.T.I. Ploughs can also be fitted with steel breasts at an extra charge if specially ordered, and the B.T. with wrought-steel shares.

Mark	Size of Furrow in inches.	Average Weight.	Draught.		
A.T.	**4** deep × **8** wide	**80** lbs.	.. **1** to **3** bullocks.	**Price, complete Rs.**	**53**
B.T.	**5** ,, × **9** ,,	**110** ,,	. **2** ,, **4** ,,		**68**
D.T.I.	**7** ,, × **12** ,,	**198** ,,	.. **6** ,, **8** ,,		**110**
As above but fitted with wood beam and handles.					
A.T.R.					**50**
B.T.R.					**63**
D.T.R.					**105**

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. Ltd ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

Ransomes' Light Turnwrest Plough.

With Single Wood Handle.


RANSOMES SIMS & JEFFERIES Ld ENGLAND

218

This Plough is suitable for light lands only, and is fitted with wood beam and single wood handle, as illustrated.

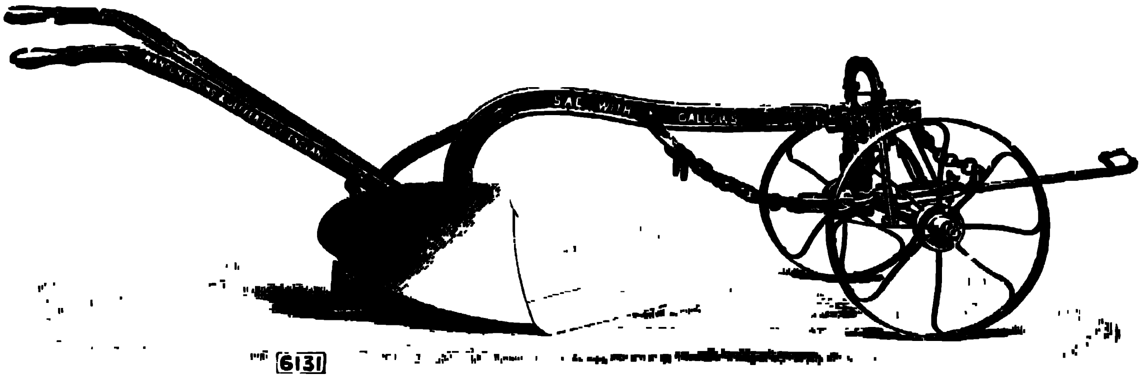
The implement can be supplied complete, as shown, or, if preferred, the iron-work only with bolts can be sent, in which case the beam and handle would have to be supplied and fitted locally.

Cast breasts and chilled shares are usually fitted, but if specially ordered steel breasts can be supplied at an extra charge. The shares are marked A.T

Mark.	Size of Furrow in inches.	Average Weight, complete	Average Weight of Iron-work	Draught
A.T. 4	**4** deep × **8** wide	**62** lbs	**52** lbs	**2** bullocks.
Price, complete				**Rs. 44**

Ransomes' Strong Steel Plough, S.A.E. Type.

(With Gallows.)



6131

The above illustration shows Ransomes, Sims and Jefferries' S.A.E. Plough, fitted with loose fore-carriage. This form of wheel carriage and draught is very popular in those countries where the farmers have to depend entirely on the natives to use the plough.

The chief feature of this arrangement is that the wheels swivel independently of the beam, so that the plough can be easily turned at the ends by laying it over on the left side, and there is no danger of bending or straining the wheel carriage, which is so often done with the fixed wheels through careless handling by the natives.

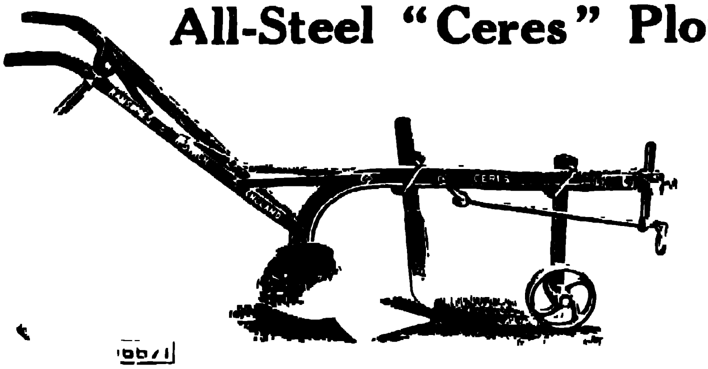
The Plough is suitable for working on all kinds and conditions of soil and for breaking up new land.

The Shares are marked S.A.E. 2 W.

Mark	Size of Furrow in inches. **5** to **10** deep × **10** to **14** wide.	Average Weight	Draught **6** to **10** bullocks	Price.
S.A.E.	With head wheel	**230**		**Rs. 135**
S.A.E.	„ two wheels	**265**		„ **150**
S.A.E.	Gallows	**295**		**168**

Ransomes' All-Steel "Ceres" Plough.

The "Ceres" is an exceedingly light Plough made specially for use with a single horse or bullock in Eastern countries.



All parts, except the wooden handle grips and the chilled iron head wheel, when fitted, are made of steel.

The Beam is made of special I section steel which has the advantage of being light and yet very strong

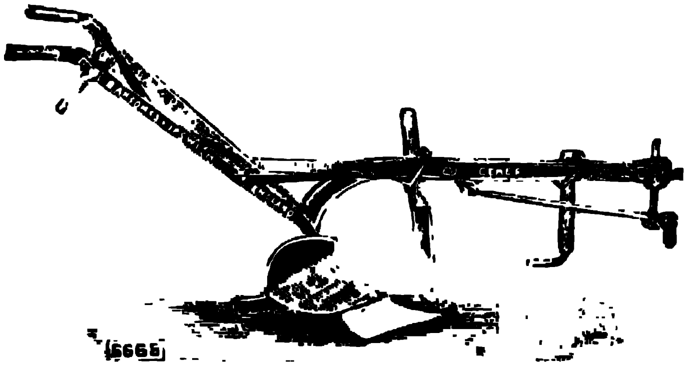
The Plough Body is built in the same manner as the "Victory" Ploughs, *i.e.*, on a pressed steel bottom which rigidly unites the share, breast and landside, making a very firm fixture to the beam

This Plough can be fitted with either a head wheel, as shown in the above illustration, or with a skid as shown below. If required, it can also be supplied without head wheel or skid.

Single or Double Handles can be supplied as required, and the Plough can be supplied with or without knife coulter.

The Draught is taken from the centre of the beam by means of a draught rod, the position of which is regulated by an adjustable upright which is free to move both horizontally and vertically.

The Share, which is of solid wrought-steel properly hardened and tempered, is marked V.Y 2 W , and is the same as that used with the "Victory" Plough.



The following are the leading particulars --

Weight of Plough with double handle alone	55 lbs.
.. .. with coulter	58 ..
.. .. and skid	61 ..
.. .. head wheel	64 ..

Mark.	Size of Furrow in inches.	Draught.
"CERFS"	**3 to 5 deep × 6 to 9 wide**	**1 large or 2 small bullocks.**

Price, complete with two handles and head wheel .. .. **Rs. 45**
Skid and coulter extra.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS.

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' All-Steel "Victory" Plough.

The "Victory" Plough has been specially designed to meet the requirements of cultivators requiring a simple light Plough, taking only a minimum of draught.

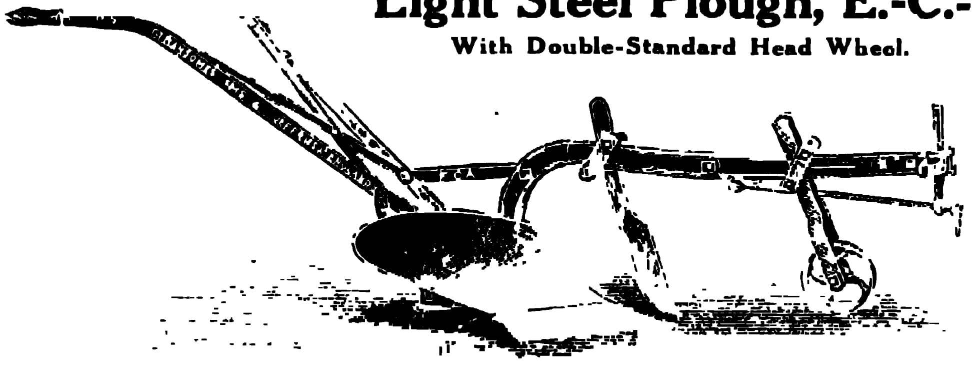
The Plough Body is built on a pressed steel bottom which firmly holds together the breast, share and landside, making them an exceptionally rigid fixture to the beam.

The Plough is fitted with steel handles provided with wooden grips and is usually supplied with a knife coulter.

The Share, which is of solid wrought-steel, carefully hardened and tempered, bears the mark V.Y.2 W.

Mark of Plough	Size of Furrow in inches	Average Weight.	Draught.
"VICTORY."	**3** to **6** deep × **6** to **10** wide	**85** lbs.	**1** or **2** oxen, mules or horses.

Price, with one Wheel and Knife Coulter .. **Rs. 56-0**
Extra Shares, each . .. **4-0**



Ransomes' Light Steel Plough, E.-C.-A.

With Double-Standard Head Wheel.

The Share and Breast are of best steel, and the "**Bottom**" to which the beam is attached is of particularly strong design, being made of pressed wrought-steel thus rendering breakages almost impossible.

The Beam is also of best steel and of the well-known "Swan Neck" pattern, which gives the greatest amount of clearance for ploughing weedy land.

The Landside is provided with an adjustable heel-piece for regulating the pitch of the share

The Shares for this Plough, which are of solid wrought-steel, are marked E.C. 2 W.

Mark.	Size of Furrow in inches.	Average Weight.	Draught.
E.-C.-A. with double standard head wheel.	**4** to **7** deep×**9** to **12** wide.	**140** lbs.	**4** to **6** horses or oxen.

Price, with 1 Wheel, Steel Breast and Share and Knife Coulter .. .. **Rs. 85-0**
" " 2 " " " " " " " " .. . " **95-0**
" " Gallows " " " " " " " .. .. " **132-0**
Extra Steel Shares, each . .. . " **5-0**

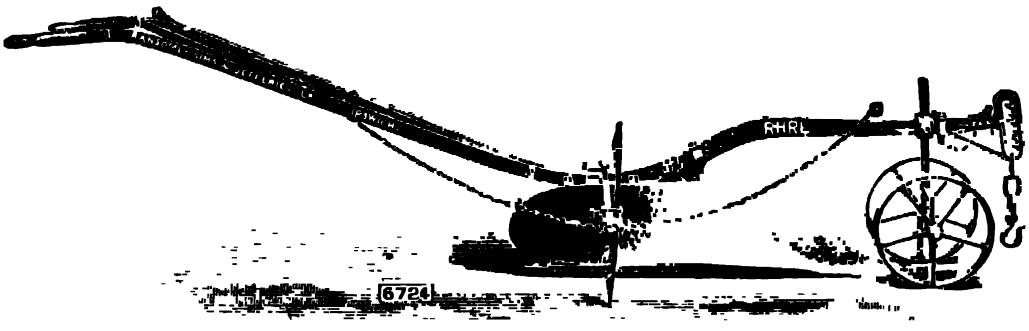
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' Ridging Plough R.H.R.L.

These ploughs are intended for ridging and moulding up beetroot, potatoes or other plants grown on the ridge, and for opening up furrows.



When used for setting out land, a marker is attached to the plough, which while cutting one furrow marks a course for the next.

By removing the breasts, marker, and front cutter and substituting a subsoil cutter **R.H.R.S.**, the plough may be used for subsoiling, or by attaching a hoe frame and curved cutters, a hoe plough is formed.

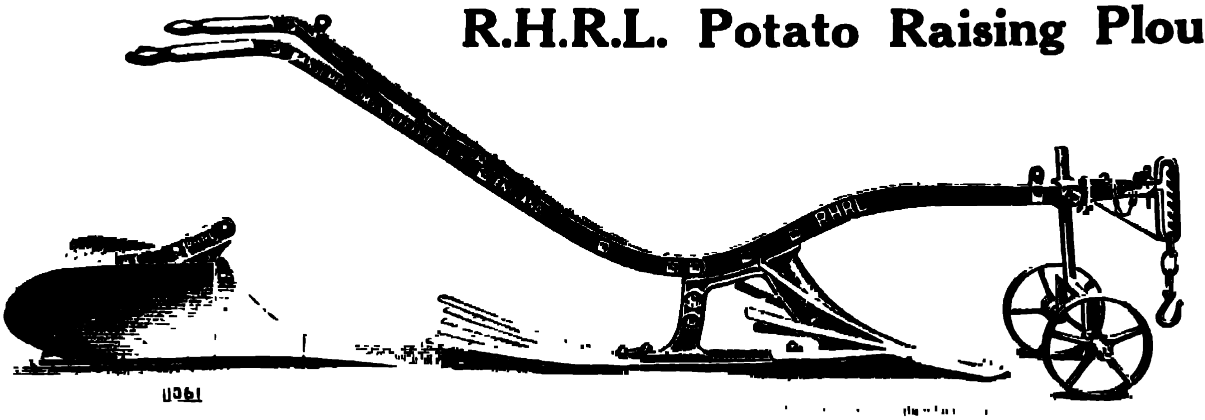
These ploughs have malleable steel frames, and can be fitted with double head wheel, as illustrated, with single head wheel, or with two adjustable wheels, the cost varying according to the fitting.

The cast-steel shares to fit these ploughs are marked **R.H.R.**, but if specially ordered wrought-steel shares bearing the mark **R.H.R.**-2W can be fitted. The breasts are made in cast chilled metal, but if specially ordered can be supplied in steel at an extra charge.

Mark.	Height of Breast.	Width between Breasts.	Average Weight	Draught.
R.H.R.L. (As a Ridging Plough)	**11** ins.	**18** ins.- **26** ins.	**148** lbs.	**2** -4 Buffaloes.

Price: Complete with marker, and double head wheel .. .. **Rs. 140**

Ransomes' R.H.R.L. Potato Raising Plough.

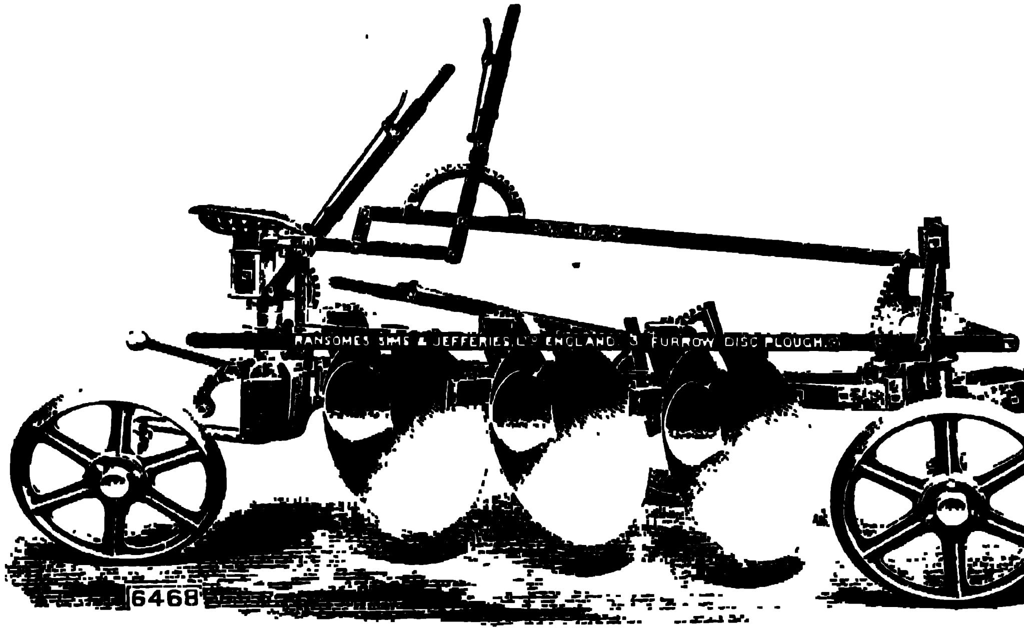


These ploughs are similar to the R.H.R.L. Ridging Plough illustrated above but are adaptable for potato raising, a cast chilled share marked R.N.R.18 being supplied for the purpose.

Mark	Depth of Ploughing.	Average Weight.	Approx. Draught.
R.H.R.L. (As a Potato Plough)	**5** ins. to **7** ins.	**155** lbs.	**4** Buffaloes.

Prices on application.

Ransomes' "Key-Conqueror" Disc Ploughs.


RANSOMES SIMS & JEFFERIES L^D ENGLAND 3 FURROW DISC PLOUGH
6468

The great success of their **"Defiance" Disc Ploughs,** induced Messrs. Ransomes, Sims and Jefferies, Ltd., to bring out some few years back a series of Disc Ploughs suitable for more strenuous work, which they named "Key-Conqueror." These Ploughs are designed for ploughing under strenuous conditions; they will deal with land when in a dry hard state, and are suitable for general ploughing, either with animal or mechanical draught in most soils.

A special feature in the design of the "Key-Conqueror" Plough is that it automatically steers itself in the direction of the draught, such as turning to the left at the furrow ends, and only when turning to the right when lowered as in work is it necessary to raise a small stop to allow the hind wheel to swivel, if self-steering is desired. A hand lever steerage is also fitted, and this can be conveniently worked from the seat if required. For safety, when travelling out of work, the self-steering arrangement can be locked if desired.

The disc supplied are 24 inches in diameter, but at a small extra cost, discs 26 inches in diameter for deeper ploughing can be fitted.

"Key-Conqueror" Disc Ploughs are manufactured in sizes from 2- to 6-furrow. The 3-furrow can be converted into a 2-furrow, the 4-furrow into a 3-furrow, and the 6-furrow into a 5-furrow if required.

Size of Plough.	Size of each Furrow in inches. 24 ins. diameter discs.	Approx. Draught.	Average Weight.	
2-furrow "Key-Conqueror'	**9** to **10** wide × **6** to **10** deep	**6** to **8** bullocks	**1,020** lbs.	**Rs. 500**
3-furrow ,,	**9** to **10** ,, × **6** to **10** ,,	**8** to **12** ,,	**1,180** ,,	,, **605**
4-furrow ,,	**9** to **10** ,, × **6** to **10** ,,	**10** to **14** ,,	**1,410** ,,	,, **715**
5-furrow ,,	**9** ,, × **6** to **10** ,,	**12** to **16** ,,	**1,650** ,,	,, **950**
6-furrow ,,	**9** ,, × **6** to **10** ,,	**14** to **18** ,,	**1,840** ,,	,, **1,050**

Wheel Weights, weighing **70** lbs. each, can be supplied for use when ploughing extremely hard and dry land; one is recommended for each furrow wheel for Ploughs up to 4-furrow, and two for each furrow wheel for 5- and 6-furrow Ploughs.

These Prices include Spiral Spring Attachment, Wire Rope and Drawbar.

Wheel Weights can be supplied at an extra cost of **Rs. 18-0** each.

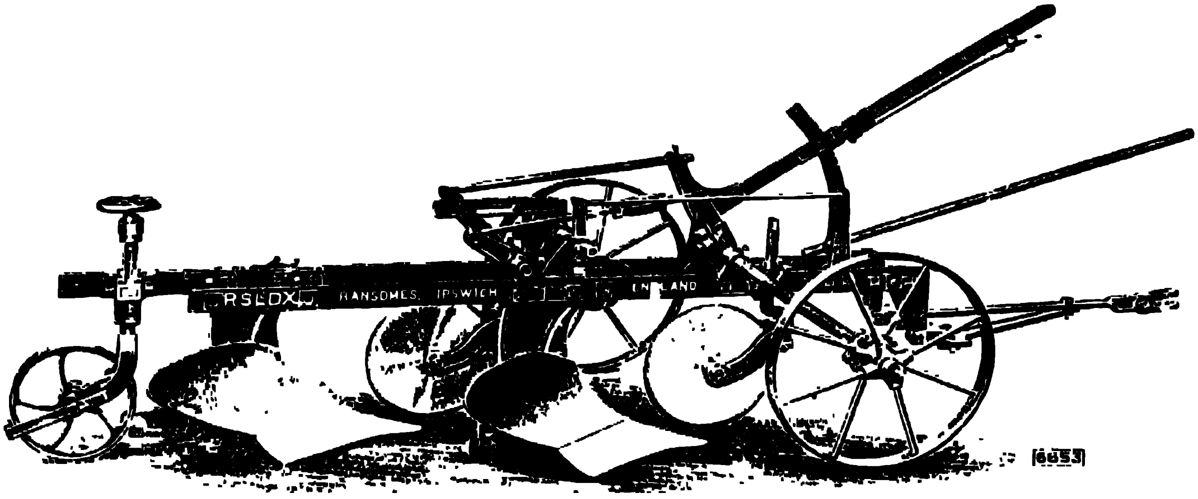
Sets consist of 3 weights for sizes up to 3-furrow ploughs and 6 for 4, 5- and 6-furrow ploughs.

CALCUTTA. JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

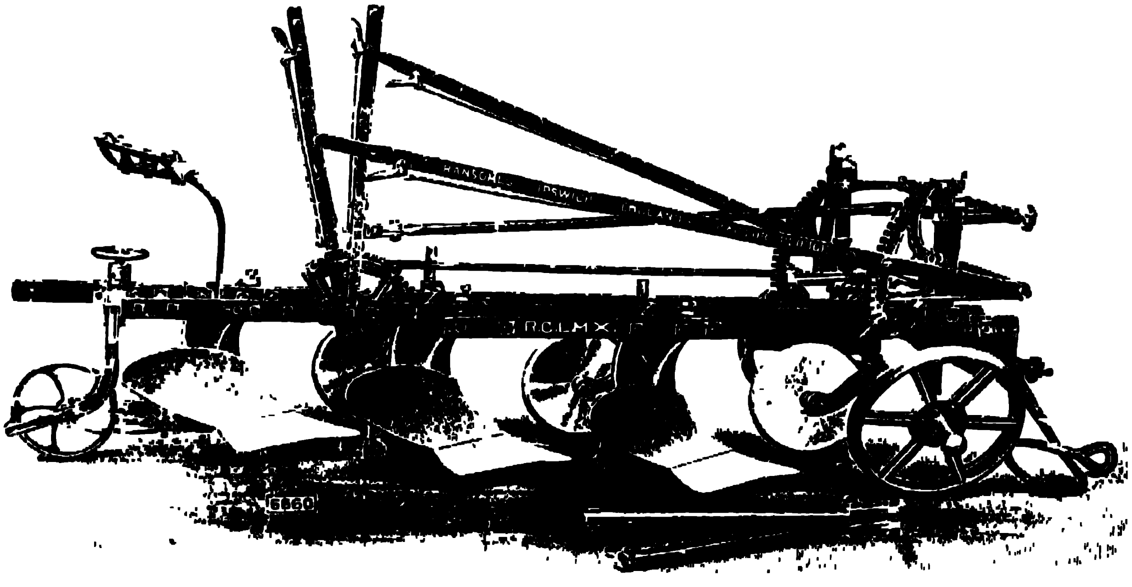
RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' New 2- and 3-Furrow Self-Lift Tractor Ploughs.



Two-furrow R.S.L.D.X. Plough with steel breasts, adjustable drawbar, and swivel disc coulters, weight about 730 lbs.

Ransomes' New 2- and 3-Furrow Steerage Tractor Ploughs.



Three-furrow R.C.L.M.X. Plough with sliding frame (convertible to two-furrow), with steel breasts, wire rope, drawbar and swivel disc coulters, weight about 1,150 lbs.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' New 2- and 3-Furrow Tractor Ploughs.

Self-Lift Type.

Messrs. Ransomes, Sims and Jefferies, Ltd., in view of the great development in the use of 2- and 3-furrow Ploughs drawn by light tractors of every description, have given special attention to the designing of a simple, efficient, strong tractor Plough provided with an effective self-lifting arrangement.

The Frames are constructed of plain steel beams connected together by strong screwed stays. **Forged Steel Heads** are bolted to the beams, to which the hake is attached, and sufficient range is provided to cover the correct positions of draught for all types of tractors. **The Skifes** are of steel and are fitted with adjustments for "pitch." **The Breasts and Shares** are of solid steel, and the latter are marked D.M. 2 W. The breasts are marked R.S A. 9. **The Wheels** are of wrought-steel having rounding tyres.

The Plough can also be supplied with both cord-lift and lever-lift when required, at an extra charge for the second lift, it being understood that only one kind of lift can be on the Plough at the same time In ordering Self-Lift Tractor Ploughs, the kind of lift or lifts required should be specified.

Swivel Disc Coulters are the standard fittings, but knife coulters can be supplied if required.

Prices:—

R.S.L.D.X. Two-furrow with steel breasts, swivel disc coulters and adjustable Drawbar	**Rs. 705-0**
R S.L.M.X. Three-furrow with steel breasts, swivel disc coulters and adjustable Drawbar	**Rs. 850-0**

Steerage Type.

These Ploughs have been designed for tractor work when it is preferred that the operator should be on the seat. They have many points similar to those described above, but instead of being fitted with a self-lifting arrangement the Plough is raised out of work at the end of the furrow by the lever provided.

The Steerage Arrangement is fitted to the furrow wheel and is controlled from the seat. Independent levers are fitted for regulating the depth of the land and furrow wheels. **Swivel Disc Coulters** are the standard fittings, but knife coulters or skim coulters can be supplied if required.

The Breasts and Shares for these Ploughs are the same as those for the Self-Lift Tractor Ploughs and they will do the same size of furrows.

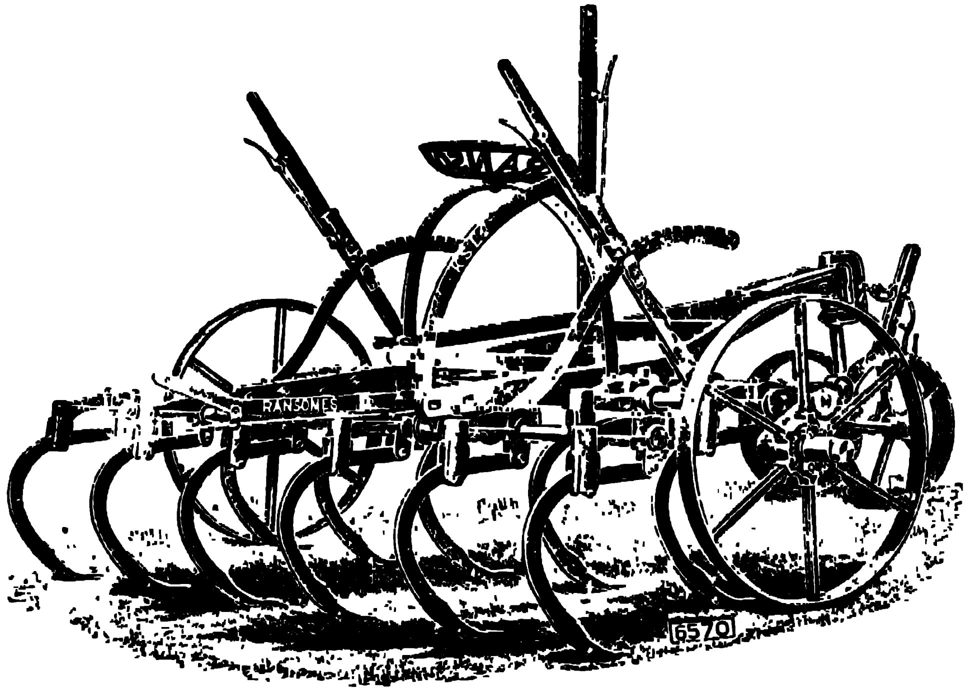
The 3-Furrow Plough of this type is easily convertible to a 2-furrow. A simple arrangement is provided which enables the operator by the movement of a lever to slide the frame on the crossbars and cut out of work the front body. In hilly districts this arrangement is a great advantage, as without loss of time the alteration can be made so that two furrows are ploughed uphill and three furrows downhill.

Prices:—

R C.L.D X. Two-furrow Ploughs with steel breasts, swivel disc coulters, wire rope and Drawbar	**Rs. 750-0**
R.C.L.M.X. Three-furrow Ploughs with steel breasts, swivel disc coulters, wire rope and Drawbar	**Rs. 880-0**

Ransomes' "Orwell" Cultivators.

I.S.L. and K.S.L.



For use with Tractors.
With Double Swivel Wheels.

These Patent Steel Cultivators are fitted with side levers and expanding cranked axles to the road wheels, by means of which the depth of work can be altered without interfering with the "pitch" of the tines which is a very important feature.

The Tines and Spring Boxes are all alike, no cranked tines being necessary to cut up the wheel tracks, and there is ample clearance between the front and hind rows.

The Main Frame is made with twin front bars and steel brackets, and its rigidity is maintained when the axles are expanded

Two Lifting Levers are provided which can be operated either from the seat or when walking behind. It is essential to raise the tines when turning at the headlands.

The Road Wheel have renewable bushes, secured with three bolts and are fitted with grease lubricators.

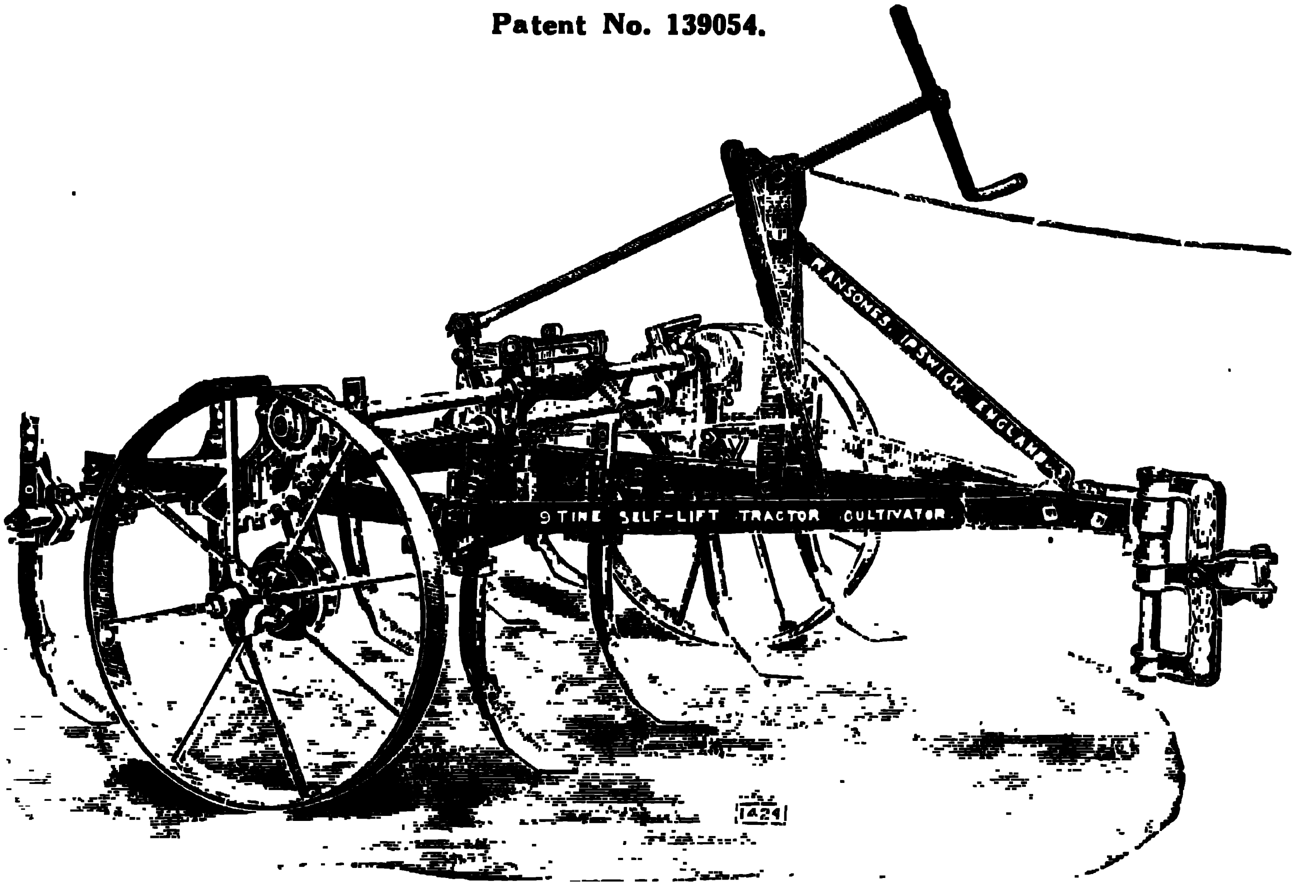
The Standard Fitting of the "Orwell" Cultivator is with solid steel spring-mounted tines; but spring-mounted taper spring tines, specially recommended for working on rocky land, can be fitted if desired.

Specification.

	I. S. L.	K. S. L.
Number of Tines.	9	11
Distance from centre to centre of tines .. .	9 ins.	9 ins.
" " " " outside tines ..	6 ft. 0 ins.	7 ft. 6 ins
Width will cultivate	6 " 9 "	8 " 3 "
Distance between front and back row of tines ..	1 " 9 "	1 " 9 "
Size of tines	1 " 4 "	1 " 4 "
Size of road wheels	2 " 4 "	2 " 4 "
Weight .. .. approx.	750 lbs.	800 lbs.
Price, with special Hake for Tractor .. Rs.	**460**	**510**

Ransomes' "Dauntless" Self-Lift Tractor Cultivator.

Patent No. 139054.



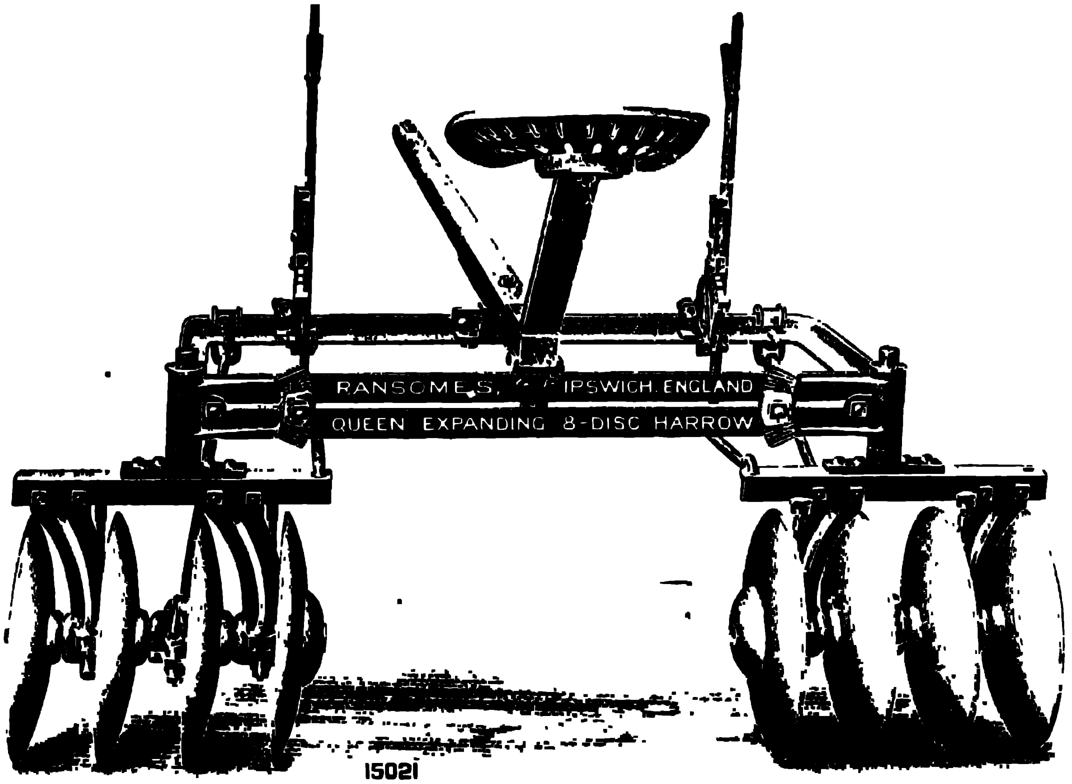
Ransomes' "Dauntless" Cultivator has been specially designed to meet the demand for a strong implement of suitable weight for working with motor tractors. **The Frame** is so arranged that either 9 tines 9 inches apart or 11 tines 7½ inches apart can be fitted. **The Tines** are interchangeable and have renewable points 3 inches wide of high grade tool steel.

The Lifting Mechanism contains no complicated working parts likely to get out of order. It is so arranged that either wheel will lift the cultivator whilst the other is stationary, as when turning at the headlands. The adjustments for depth and the cord for operating the self-lift can both be conveniently operated from the driver's seat on the tractor. **The Wheels** are very strongly made, having "staggered" spokes which give great lateral strength. They are fitted with dust-proof, oil-retaining bushes.

The Standard Fitting of the cultivator is with a hake and connection for attaching it direct in the tractor drawbar, and sufficient adjustment is provided to suit practically all types of tractors. A double head wheel or single head wheel can be supplied as an extra if required.

Number of Tines.		9	11
Distance from centre to centre of tines ..	..	9 ins.	7½ ins.
" " " " outside tines	..	6 ft.	6 ft. 3 ins
Total width will cultivate	..	6 ft. 3 ins.	6 " 6 "
Distance between front and back row of tines	..	2 " 8 "	2 " 8 "
Diameter of wheels	..	2 " 8 "	2 " 8 "
Nett weight (without head wheel) ..	..	820 lbs.	860 lbs.
Price, ...	**Rs.**	**595**	**625**

Ransomes' "Queen" Expanding 8-Disc Harrow.



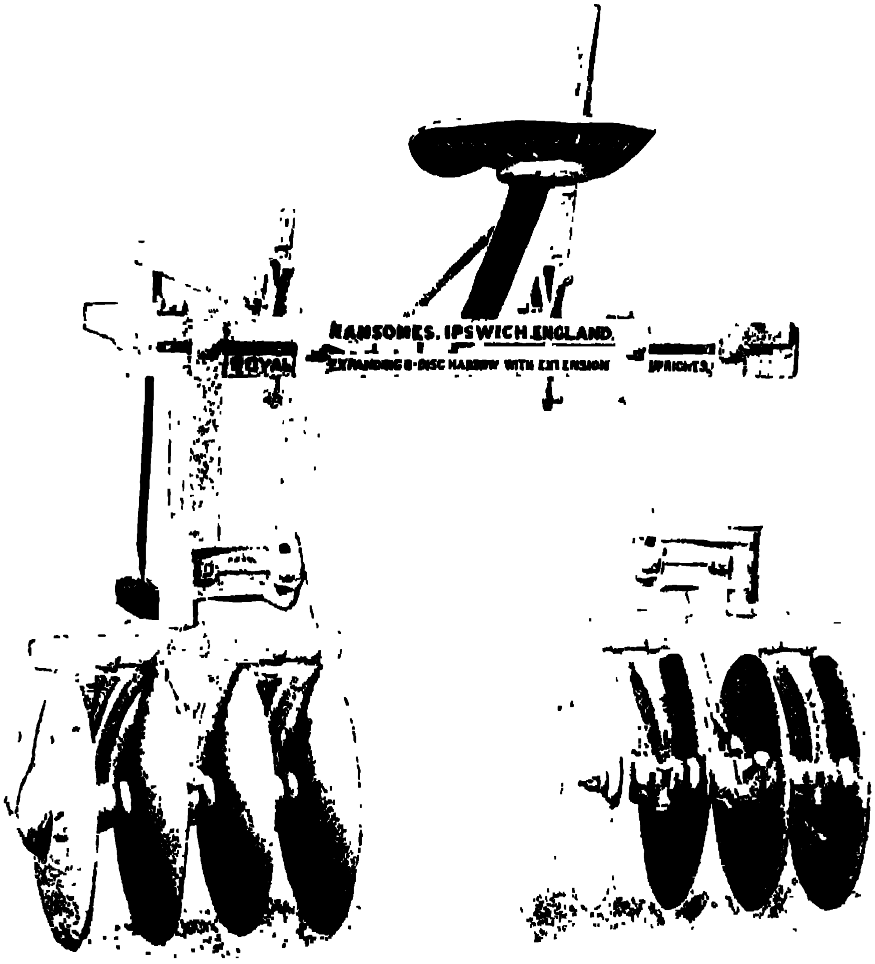
The "Queen" Expanding Disc Harrow in the form illustrated above is specially intended for cultivating the soil between rows of growing crops such as cotton, maize, etc., and for working in vineyards and orchards, between the growing vines and trees. For maintaining surface cultivation and also for preventing the growing of weeds, the occasional use of a revolving disc cultivator such as the "Queen" is the most economical and best practice known.

The special advantage of the "Queen" Expanding Disc Harrow is its adaptability for cultivating crops growing either on hills or ridges, requiring the earth to be thrown towards them or in furrows requiring the earth to be taken away from them. To adapt the implement to either of these conditions it is possible to tilt the disc gangs in either one or the other direction in order to in-throw or out-throw the soil as required.

To alter the Harrow from out-throwing to in-throwing or *vice versâ*, all that is necessary is to disconnect the two draught rods and two angling rods, and, after removing the two split pins from the pivotal mountings, to change the disc gangs one side with the other.

For particulars and prices see next page.

Ransomes' "Royal" Expanding 8-Disc Harrow With Extension Uprights.


RANSOMES. IPSWICH ENGLAND
ROYAL
EXPANDING 8-DISC HARROW WITH EXTENSION UPRIGHTS

The "Royal" Expanding 8-Disc Harrow as illustrated above is exactly similar to the "Queen" Harrow, except in so far as it is provided with Extension Uprights which enables it tc be used for cultivating the soil between rows of fairly well matured crops, where, if the "Queen" Harrow was used, damage would result.

Out-throw.		In-throw.	"Queen" Harrow. Price.	"Royal" Harrow. Price.
4 ft. 4 ins.	Length of Angle Frame	4 ft. 4 ins.		
2 „ 6 „	Distance between gangs when fully extended	2 „ 4 „		
6 „ 6 „	Width outside gangs when fully extended .	6 „ 0 „	Rs. 240	Rs. 280
4 „ 0 „	„ „ „ „ closed .. .	....		
1 „ 6 „	„ of each gang	1 ft. 6 ins.		

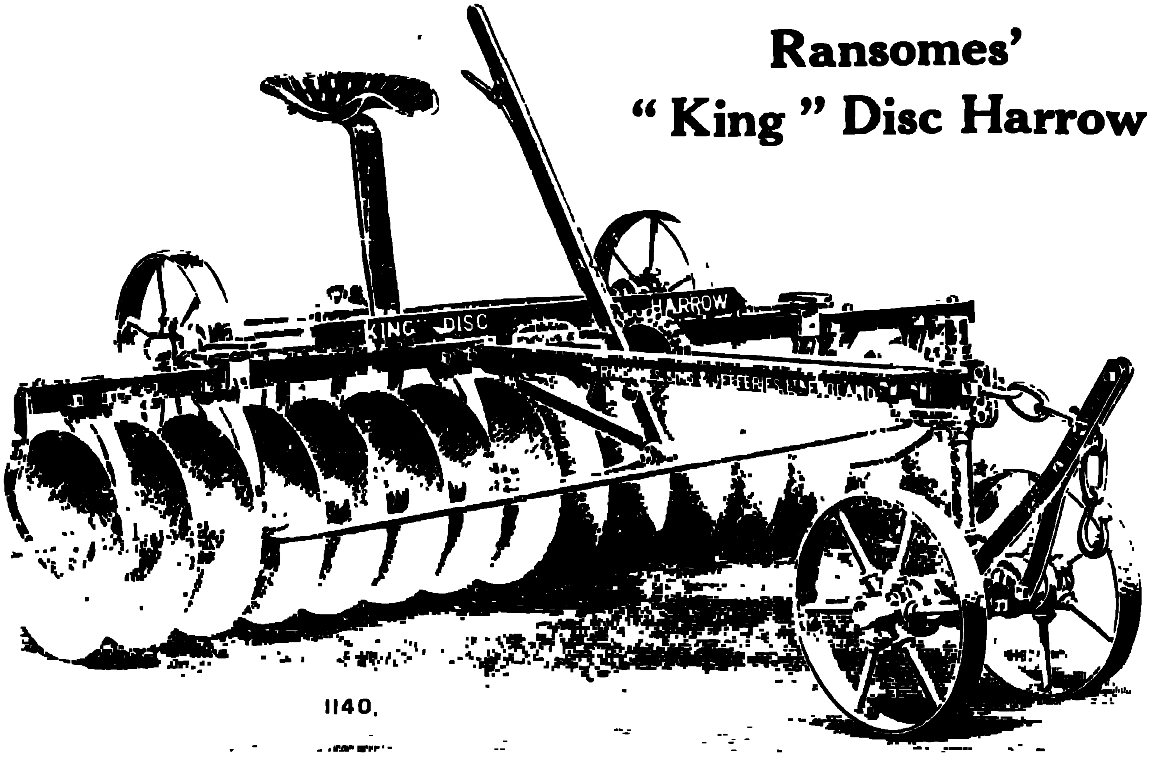
Approximate draught .. .. 2 Horses or Oxen.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' "King" Disc Harrow.



Ransomes' "King" Disc Harrow, with plain Discs, ready for work.

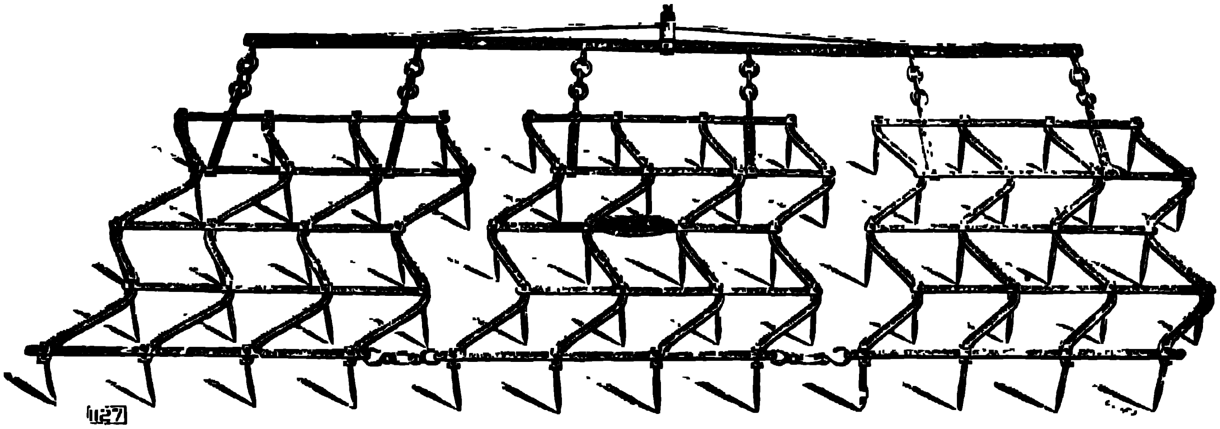
The above illustration represents Ransomes' improved "King" Disc Harrow with transport carriage complete. It is made of the very best material throughout and is designed for cultivating the land preparatory to making a seed bed, which work it accomplishes in a very efficient manner. It is particularly suitable for handling by unskilled labour and its weight is sufficient to enable it to enter all classes of land with the driver's weight only.

Each Gang of Discs has three Bearings. All bearings are fitted with renewable solid chilled bushes, which are entirely dust-proof and oil retaining; these work in connection with axle sleeves which are also renewable. **The Axles** are of large section, and are sufficiently strong for the heaviest and most strenuous work. **A Lever,** within easy reach of the driver's seat, operates the Harrow in work. By its use the angle of the disc gangs can be adjusted to suit the depth and quality of work required. **Either Plain or Cutaway Discs can be supplied.** All discs are of highly tempered steel and have machined cutting edges. Each disc is provided with **an efficient clod stopper** or scraper. Plain discs are usually preferred for general cultivation. Cutaway discs are useful for cutting up exceptionally hard and dry earth **Four Steel Transport Wheels** are provided. When using the Harrow the two hind wheels are raised from the ground by a lever. **The fore-carriage** both swivels and rocks; if desired at any time it can be secured from rocking.

"KING" DISC HARROW.	Number and Size of Discs.	Approximate Weight.	Approx. Draught.	**Price.**
8 feet wide	**16** plain **18** ins. ..	**900** lbs. ..	**8** to **10** bullocks	**Rs. 450**
8 " "	**16** cutaway **18** "	**920**	**8** **10**	**500**

Ransomes' Steel Solid-Frame Harrows.

S.A.H.



These new Harrows are made specially for the Indian Market and are very strong and durable. The beams are of H-section steel and the upper part of the tooth fits into the channel of the beam; being securely fastened by a nut and washer, each tooth is exceptionally rigid. The teeth are set at equal distances apart, and each cuts a separate track of 2 inches. Although the teeth are so securely fixed in the frame there is no difficulty in removing them for renewal or repair. These Harrows are thoroughly adapted for every description of work.

The Pommeltree is of T-section steel, and is very strong though light It is exceedingly durable, and is not likely to deteriorate by exposure.

Three-Beam Harrows with 5 Rows of Teeth and Steel Pommeltree complete.

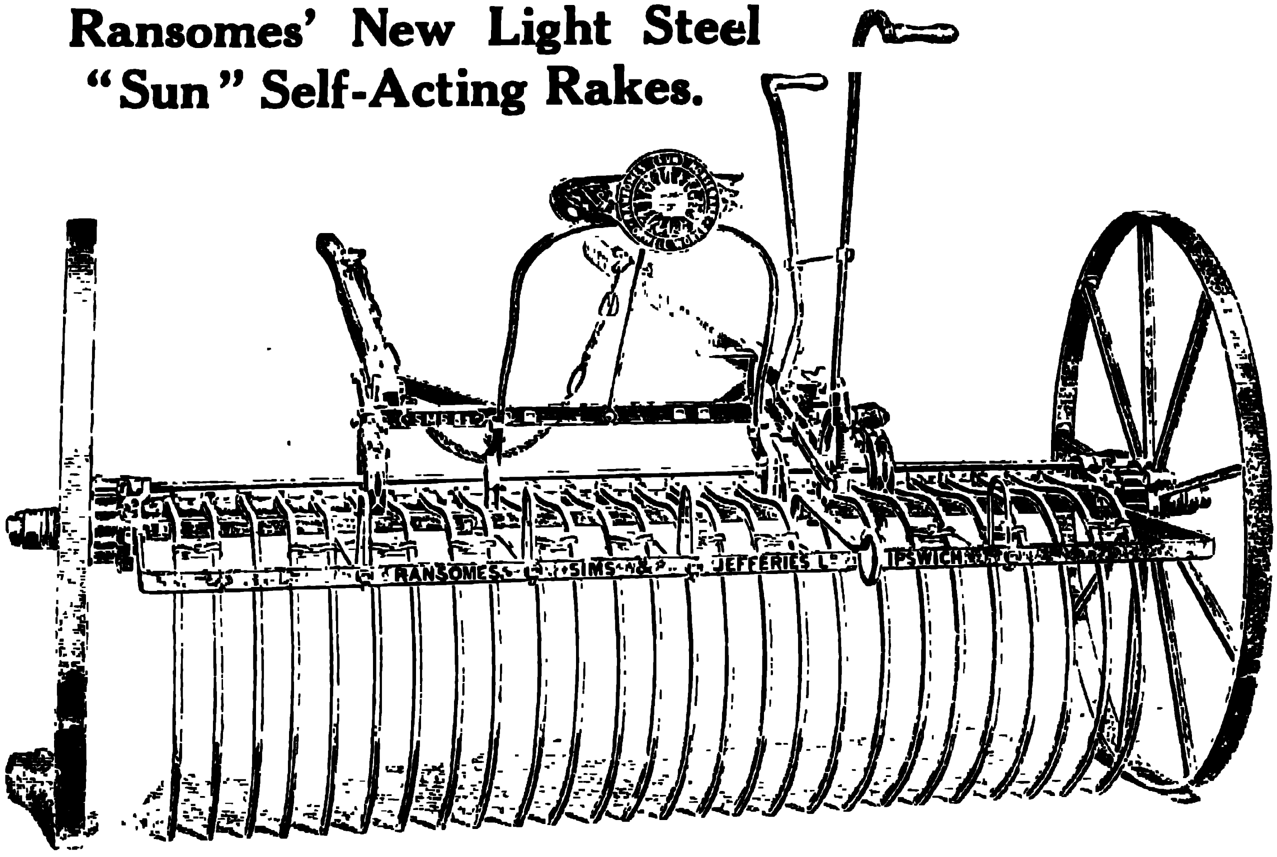
S.A.H. 43. Three Harrows to the set to cover 7½ ft. for two bullocks. Weight 145 lbs.

S.A.H. 44, Two " " " 6½ " " " 130 "

Price, S.A.H. 43 .. **Rs. 78-0**

Price, S.A.H. 44 .. **Rs. 75-0**

Ransomes' New Light Steel "Sun" Self-Acting Rakes.


RANSOMES SIMS & JEFFERIES L IPSWICH

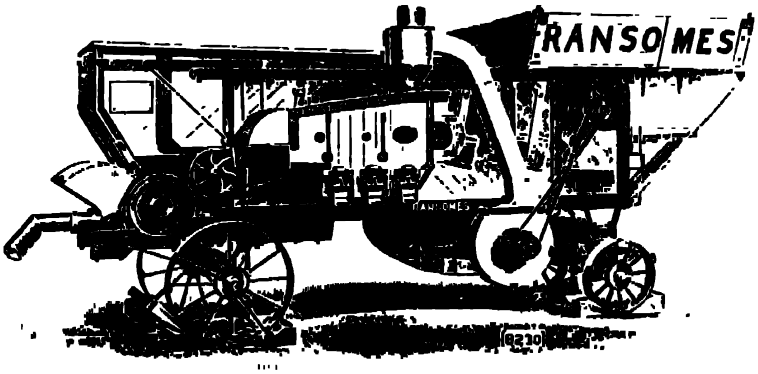
These Self-Acting Rakes have embodied in them all the principal features that have made Messrs. Ransomes, Sims and Jefferies' former Rakes of this class so successful, with the addition of certain important details. They will be found exceedingly easy to work and reliable in their action.

The parts usually made of cast-iron are in these Rakes made of steel, and consequently the weight is materially reduced. In all Self-Acting Rakes the **wheels** are exposed to great wear and when the axle wears it is a very expensive process to repair it, but in these Rakes **no wear comes on the axle,** a sleeve being attached to it upon which the wheel revolves and which can be easily renewed when worn. **The Teeth** are lifted with perfect certainty, by the improved self-acting gear, which can only operate at the will of the driver. When they have reached their proper height they are automatically released. This gear can be used either from the seat or when walking behind. The teeth can also be lifted by the hand lever without using the self-acting gear, a very important improvement which makes the Rake an ordinary manual as well as a self-acting one and enables the driver to lift the teeth over any obstacle, or when turning.

Mark.	Height of Teeth.	No. of Teeth.	Height of Frame.	Height of Wheels.	Width over Teeth		Width outside Wheels.		Average Weight.	Price.	
					ft.	ins.	ft.	ins.			
S M S 8	26 ins.	24	27 ins.	52 ins.	5	10	7	11	684 lbs.	Rs.	390
S M S 8½	26 „	26	27 „	52 „		4	8	5	704 „	„	400
S M S 9	26 „	28	27 „	52 „	6	10	8	11	716 „	„	410

Ransomes' New Patent Thrasher.

The " Mosquito."



This machine has been specially designed to meet the requirements of agriculturists whose operations are not of too large a scale, and who do not require a machine of any great capacity. The special feature of this machine is its lightness, and is therefore specially useful in remote or hilly districts, where bad roads and steep inclines interfere with free transport.

Messrs. Ransomes, Sims and Jefferies, Ltd., now build these thrashers on an all-steel frame-work to suit Indian climates and conditions. They are thus amply protected from destruction by white ants so common everywhere in India, and their rigidity enables them to withstand the roughest usage and the worst weather conditions. The Power required to drive is 6 to 8 B.H.P. which gives an output of 45 to 65 bushels of oats, 20 to 35 bushels of barley and 15 to 30 bushels of wheat per hour.

Messrs. Ransomes, Sims and Jefferies' 2.N.H.P. Portable Engine has been found quite suitable to run the machine.

Price, Rs. 3,200-0

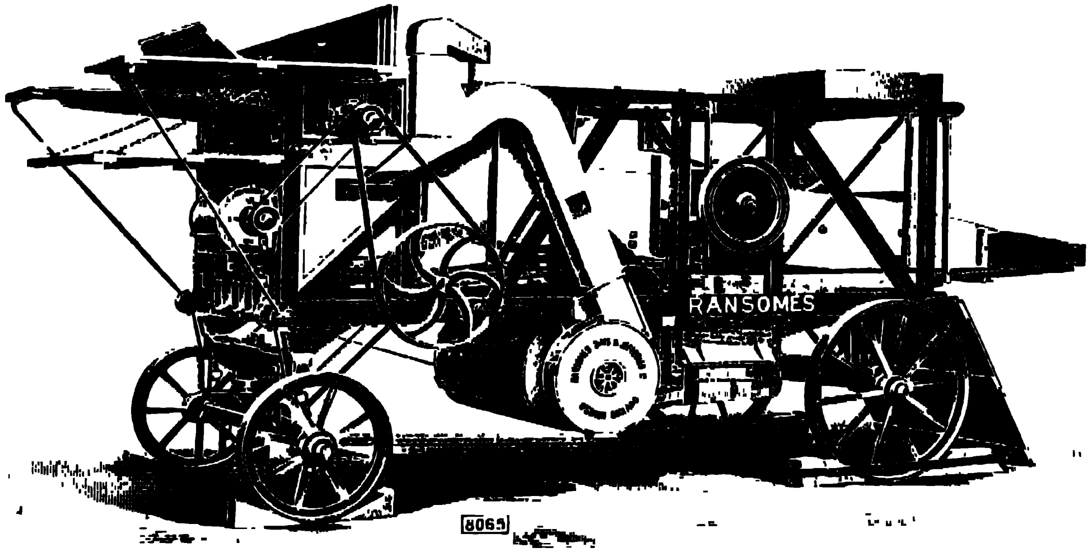
Note.—For thrashing rice, the machine can be fitted with a special rice drum and concave and with caving riddle and sieves suitable for rice in place of the standard riddle and sieves, or we shall be pleased to send full particulars and prices of **Ransomes' Special New Rice Thrashing Machine** on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' Special Straw-Chopping Thrasher.



The N.I.L. Thrasher illustrated above represents the latest development in Steam Thrashing Machinery for India. The straw is fed direct into two bruising cylinders which thoroughly soften it, producing the best bhusa, and knocking the grain out of the ear. This machine is strongly recommended where one of light construction and easy to transport is required, and where all the straw is required thoroughly bruised as food for cattle.

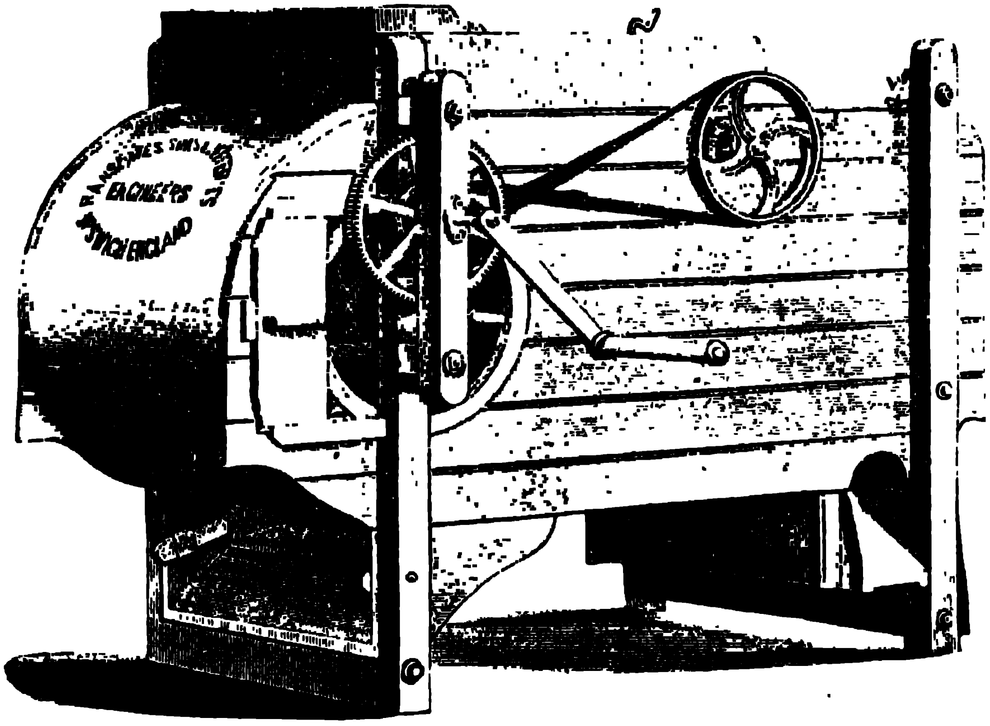
The principal features of the machine are that there is a minimum of broken grain, the bruised straw is sifted of grain, and no detached sifter is required, a centrifugal blast elevator removes the beards of barley and wheat and also the chops from the grain, and, as the machine has no corn screen, the dressing shoe is so arranged that the grain is separated into first and second qualities and delivered into sacks at the back of the machine.

Mark of Machine.	N.I.L. 30 ins.	N.I.L. 36 ins.	N.I.L. 42 ins.	N.I.L. 48 ins.	N.I.L. 54 ins.
Width of cylinders	2 ft. 6 ins.	3 ft.	3 ft. 6 ins.	4 ft.	4 ft. 6 ins.
Nominal horse power of Portable Steam Engine required	3	4	5	6	7
Approximate quantity of wheat of average yield delivered per hour in bushels .	10 to 20	15 to 25	20 to 30	25 to 35	30 to 40
Approximate nett weight of machine in cwts	55	57	59	61	63
Price .. .. .. **Rs.**	**5,250**	**5,620**	**5,900**	**6,500**	**7,000**

Ransomes' Special New Rice Thrashing Machine.

Prices on application.

Ransomes' Hand-Power Dressing Machines.



In these machines the screens as well as the sieves are made to oscillate, and their constant motion considerably increases the dressing power of the machine.

The machines are made with spiked rollers for dressing rough stuff as delivered by thrashing machines, or without spiked rollers for dressing grain which has already had one winnowing. They are supplied with sieves to dress wheat, barley, beans, peas, oats and rye, and can also be readily used for blowing dust or smuts from the grain. Two sieves and plain boards for dressing seeds can be supplied at an extra cost, and the machines can also be adapted for dressing rice, coffee or tea.

No. 7. With Spiked Roller: weight, 315 lbs. No. 8. Without Spiked Roller: weight 287 lbs.

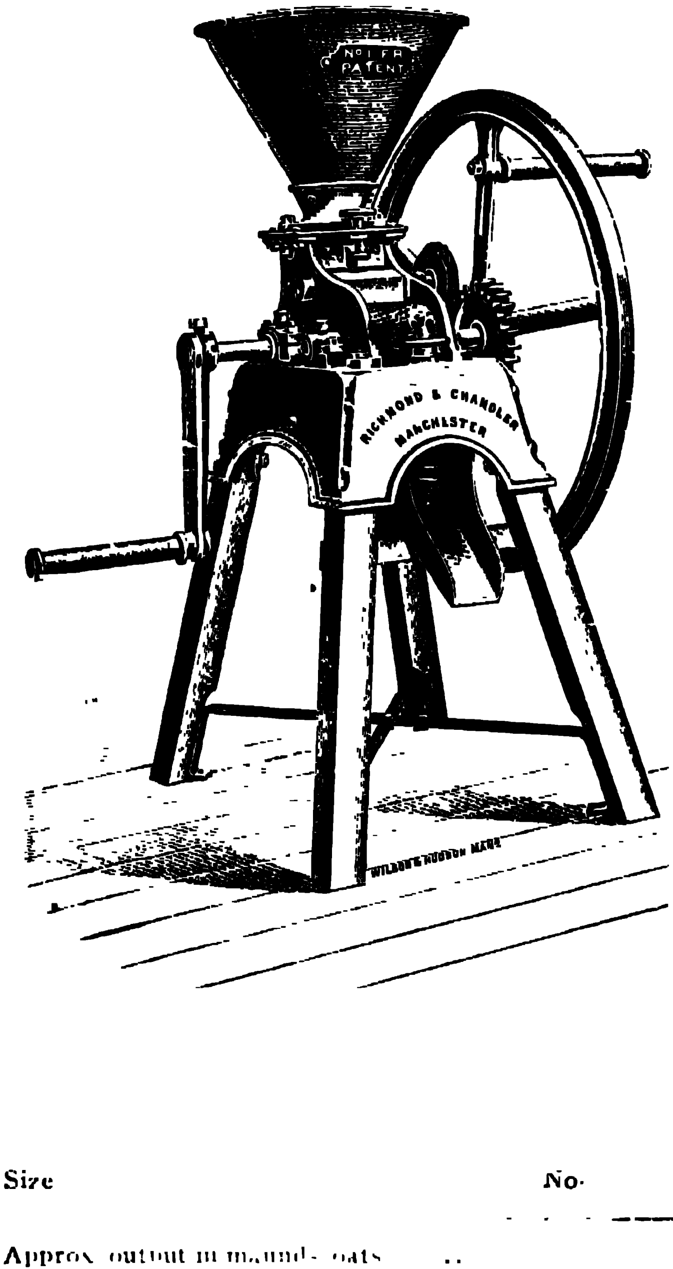
Dimensions of sieves for both machines, 21½ ins. by 20 ins.

Approximate output per hour with either machine, 50 bushels.

No. 7. **Price, Rs. 273.** No. 8. **Price, Rs. 235.**

Patent Corn Crusher.

For Oats, Beans, Peas, Maize or Malt.



These mills are for hand or power-driving, and are constructed on an entirely new principle, and are remarkable for their strength, simplicity and excellence of workmanship. They are made with cast-iron frame and rolled steel legs. The fluted rollers are accurately finished and case-hardened, and after becoming worn, they can be re-cut and hardened. The main bearings are fitted with brass steps, caps and covers for the oil-holes, to keep out the dust. A new patent parallel adjustment is also introduced into these mills, so that the rollers may be set at any distance apart to suit the various sizes of grain, the alteration being effected by simply turning a hand-wheel at the front; and another new feature is the new Spiral Spring Arrangement, which allows any hard foreign substance, such as nails, nuts, etc. (which may accidently get into the mill), to pass between the rollers without breaking or damaging the frame.

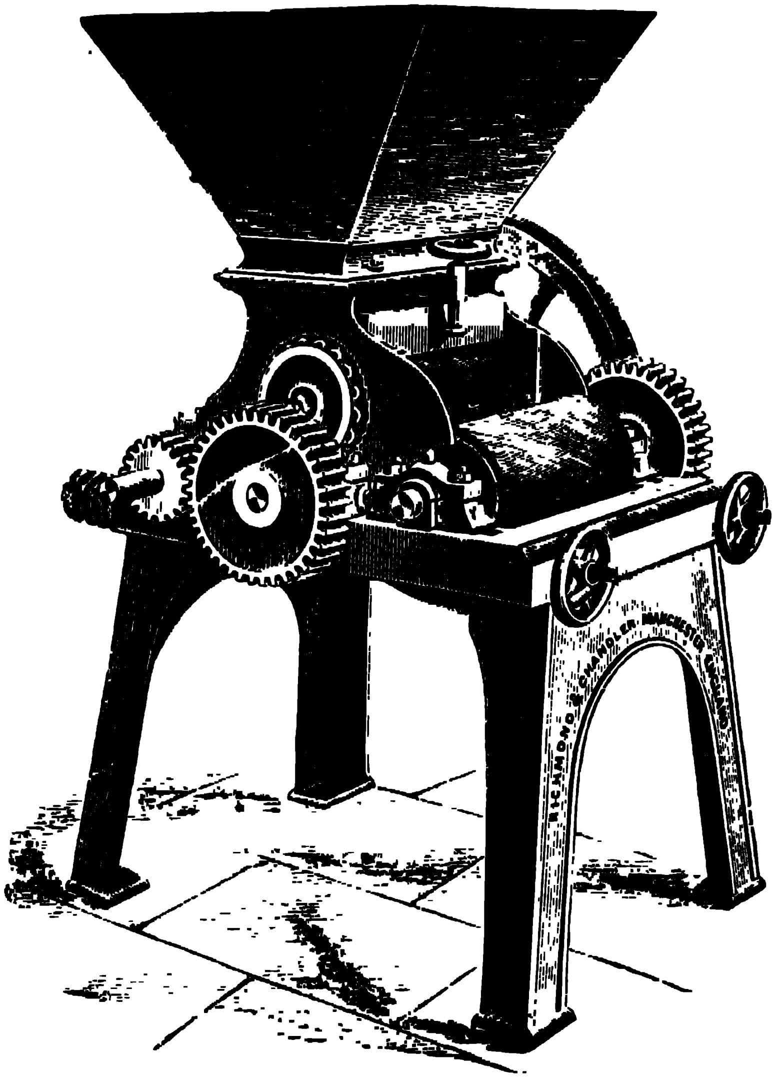
Size	No.	1 F. R.	2 F. R.
Approx. output in maunds oats	..	2	3
" power to drive	. ..	1 man	1 B.H.P
Size of rollers	.. .	5"×5"	6"×6".
Price,	.. . Rs.	245	300
Spares .. Rollers and shaft	per pair "	85	[illegible]5
Feed roller	"	20	20
Chains	. .. ..	10	10

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Newly Improved Countershaft Corn Crusher.



These Crushers are specially designed for bruising and crushing all kinds of grains for human and cattle food. They are also suitable for dealing with Lac and all kinds of Indian Pulses and other materials of that kind. They are designed specially for power driving and are mounted on a strong iron frame which makes the machine perfectly steady when in operation. They are most accurately fitted with parallel adjustment which can instantaneously be regulated by two hand-screws in front to crush to any degree of fineness. The Feed Apparatus is worked by a small hand wheel at the front, and can be regulated to any power employed, and will be found to effect an immense saving in wear and tear.

A Manbhoom District Lac Factory reported very favourably on one 4-F.R. machine purchased for crushing Lac.

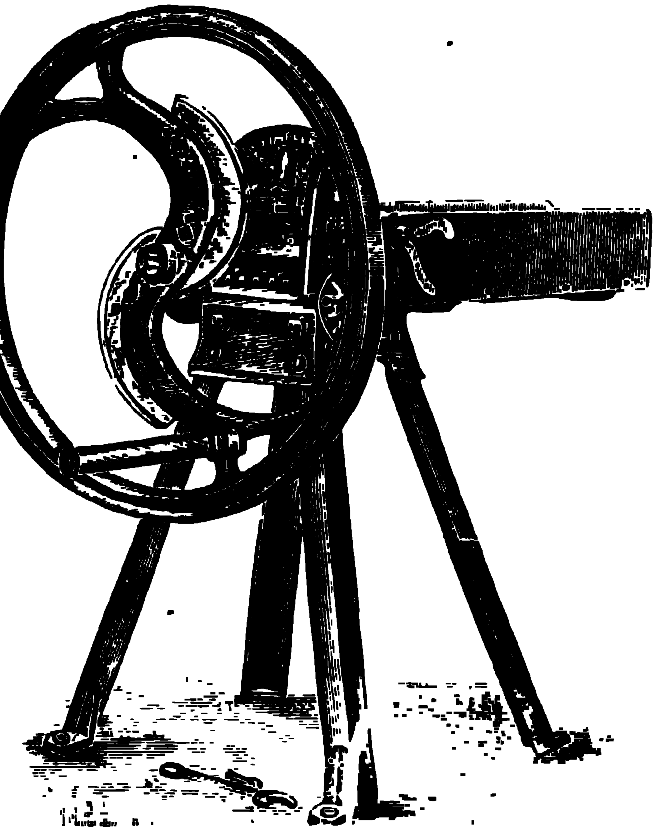
The prices include new patent spiral spring arrangement.

Size.		No	3 F.R.	4 F.R	5 F R.
Approx. Output in maunds, Oats ..		..	8	10	16
" Power to drive		..	3 B.H.P	4 B.H.	6 H.P.
Size of Rollers		.	11"×6½"	14"×8"	24"×11"
" " Pulleys		..	16"×3¾"	18"×4½	20"×5¼"
Revs. per minute		..	200	200	200
Price, with F. and L. Pulleys		**Rs.**	**545**	**760**	**1,050**
Spares ..	**Rollers and Shaft per pair ..**	"	**200**	**310**	
	Feed Roller and Shaft ..	"	**30**	**40**	
	Chains	"	**15**	**20**	

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



The "Simplex" Chaff Cutter.

For Hand-Power.

It is mounted on four steel legs and made from new pattern of improved design with wrought-iron spindles and Fixed or Rising Spring Mouth. It is suitable for small holdings or traders. It stands very steady when at work, and the worm wheels being made from machine-cut patterns, work easier and with less friction than would otherwise be possible. The mouth being a separate casting can easily be replaced when worn.

Cuts two lengths, *viz.*, $\frac{5}{16}$ inch and ⅝ inch.

Fixed Mouth, 7½ ins. by 2¼ ins.

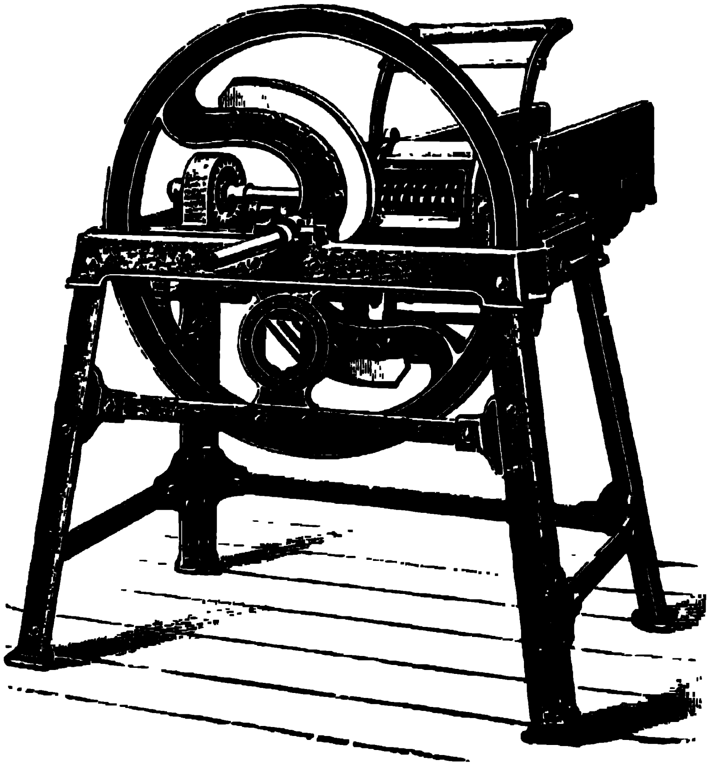
Fixed Mouth,	**Price, Rs. 90-0**
Rising Spring Mouth,	**Price, Rs. 95-0**

This Chaff Cutter was awarded a Bronze Medal at the Allahabad Exhibition, 1910-11.

The "New Pattern" Chaff Cutter.

Type D.E.

For Power or Hand Drive.



With cross-bar reverse motion and flywheel. The demand for a cheap and serviceable Chaff Cutter of this type, suitable for small farmers, dairy owners, etc., has resulted in the manufacturers bringing out this entirely new pattern machine, which for durability, strength and efficiency cannot be surpassed. We can confidently recommend this machine where small power only is available.

Cuts two lengths, *viz.*, ⅜ inch and ¼ inch.

Capacity.

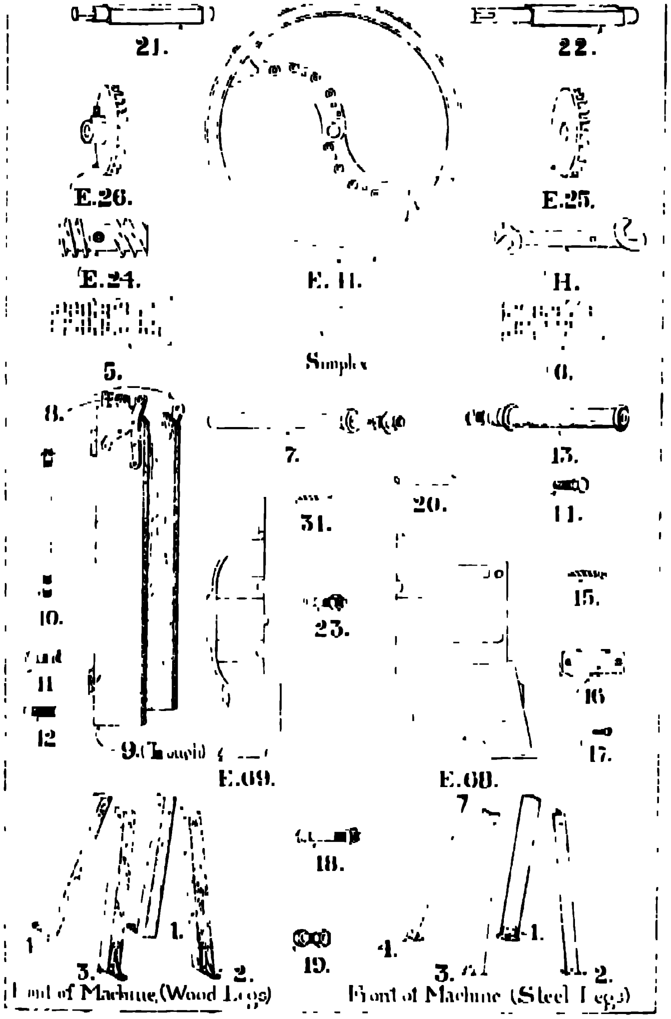
Power drive, 14 mds. of ⅜ inch chaff per hour.

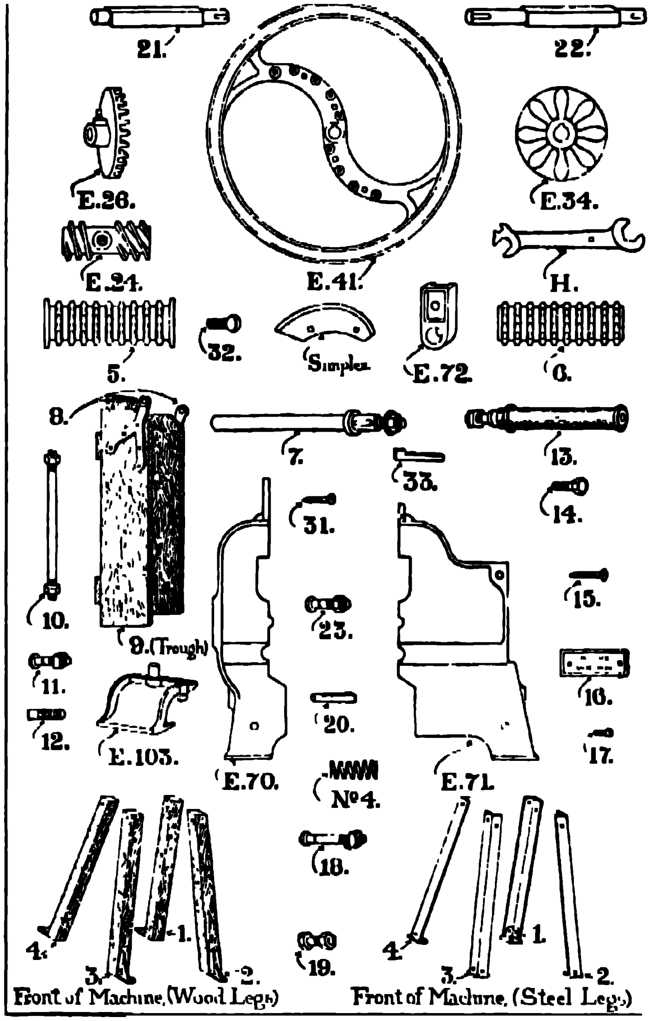
Hand drive, 4¼ mds. of ⅜ inch chaff per hour.

Power required, 1 B. H. P.

Machine for Power drive,	**Rs. 310-0**
Spare Knives,	**Rs. 10-0**
Endless Feeding Web, extra,	**Rs. 36-0**

Spare Parts for "Simplex" Chaff Cutters.





Description and No.	Fixed Mouth.		Rising Mouth.		Description and No.	Fixed Mouth.		Rising Mouth.	
	Rs.	As.	Rs.	As.		Rs.	As.	Rs.	As.
Flywheel .. E 41 ..	..		..		Presser Plate .. E 103 ..	..		7	8
Knives, "Simplex" ..	22	0	22	0	Side Lifters .. E 72 ..	..		2	0
Double Worm .. E 24 ..	7	8	7	8	Top Rolls .. No. 5 .	3	8	3	8
Worm Wheels .. E 25 ..	3	8	3	8	Bottom Rolls .. No. 6 ..	3	8	3	8
" " .. E 26 ..	3	8	..		Top Roll Spindle .. No. 21 ..	..		* ..	
Finger Wheels .. E 34 ..	3	8	3	8	Bottom Roll Spindle No. 22 ..	..		..	
Front Box .. E 69 ..	..		3	8	Trough .. No. 9 ..	..		..	
" " .. E 70 ..	12	0	22	0	" Hooks .. No. 8 ..	..		..	
Back " .. E 68 ..	..		22	0	Springs .. No. 4 ..	..		2	0
" " .. E 71 ..	12	0	22	0	Knife Bolts	..		0	4
Flywheel Spindle and Nut .. No. 7 ..	12	0	22	0	Knife Set Screws ..	0	4	0	4
Spanner H.	2	0	2	0					

*When ordering please state for which machine.

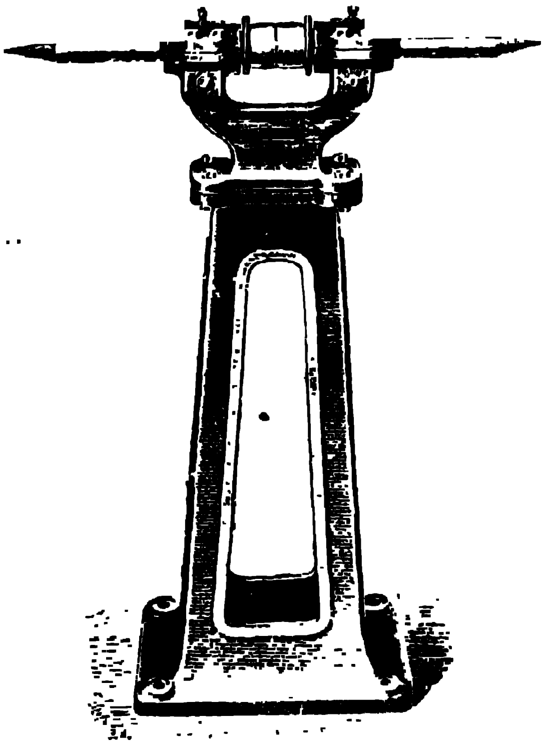
Prices for other parts on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Jewellers' Polishing Machines.



Polishing Lathe

With Self-oiling Ring-bearings.

The construction of this lathe makes it specially suitable for running at high speeds when using small size mops and bobs, as used by manufacturers of jewellery and small silver articles. It is also suitable for scratch brushing. Plates can be fitted at one or both ends if required.

Height from base to centre of Spindle	8	ins.
Diameter of Spindle ..	.. 1¼	„
Length of Spindle ..	.. 30	„
„ „ Bearings ..	.. 4⅝	„
Diam. of Fast and Loose Pulleys	.. 2¾	„
Width of Pulleys ..	.. 1½	„
Height of Stand ..	.. 30	„
Price, with stand ..	**Rs. 150-0**	
„ without stand ..	**Rs. 100-0**	

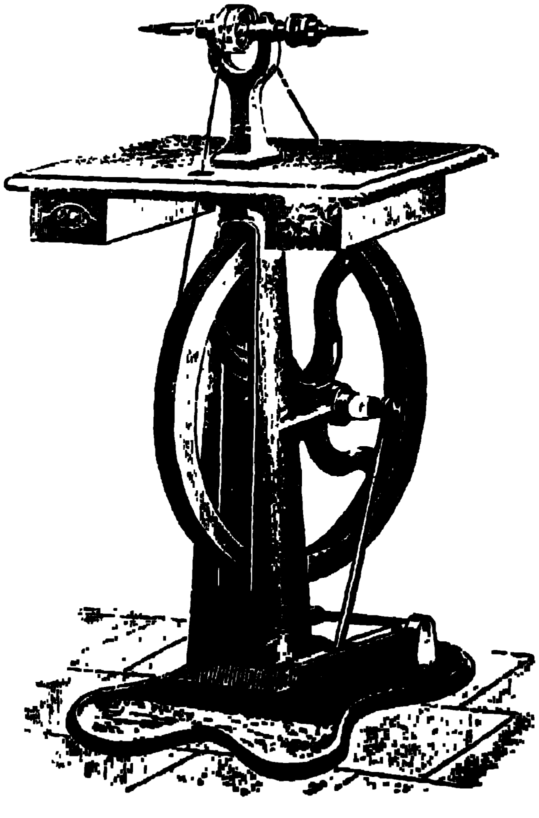
Plates and Belt moving arrangement extra.

Foot Lathe for Polishing.

This lathe is well constructed and accurately fitted. The wheel has one groove, and high speed is attainable The table is provided with two drawers for holding tools, etc. and bolt holes are in the stand to enable the lathe to be screwed down to the floor. The tapered ends of the spindle are accurately turned and will run the smallest mop or bob. Plates are provided to take an emery wheel, saw, etc.

Height from base to centre of Spindle ..	46	ins.
Lathe head, centre	6	„
Diam. of Balance Wheel	26	„

Price, Rs. 200-0.



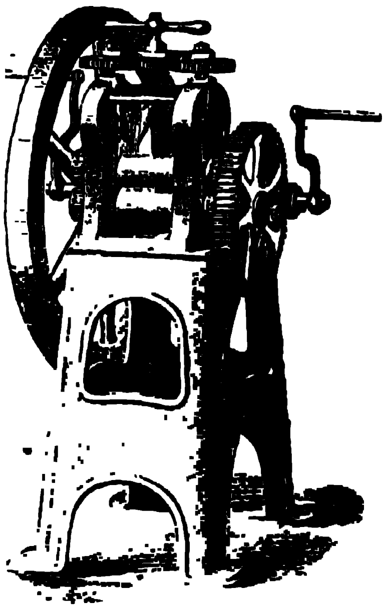
Prices for Chamois Leather and Calico Mops, Felt Bobs and Sheets on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hand Flattening Mill.



For Gold and Silversmiths.

This machine has been improved and strengthened by the addition of steel machined cut gears. It is provided with double shrouded Roll Pinions, simultaneous Roll Pressure motion, all steel Pressure Screws, hardened steel Rollers, Flywheel and two Handles, all of which are carefully mounted on a strong square stand.

Size.	Price.
Rollers 4½ × 2 11/16 ins.	Rs. 780
„ 5 × 2 13/16 „	„ 895
„ 6 × 3 1/16 „	„ 1,500

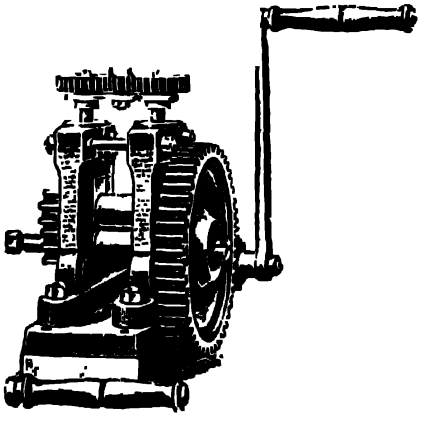
Cast Steel Jewellers' Rollers.

These Jewellers' Rollers are of hardened steel, and made from the best quality material, ground perfectly true.

The type of Roller shown is fitted with parallel motion for raising or lowering both ends of the roller at one time.

This machine can be arranged to be worked by power at a small extra cost.

Length of Rolls.	Diam. of Rolls	Price.
2½ ins.	2¼ ins	Rs. 485
3 „	2¼ „	„ 505
3½ „	2¼ „	„ 535
4 „	2¼ „	„ 585
4½ „	2½ „	„ 660
5 „	2½ „	„ 750
5½ „	2½ „	„ 840
6 „	2¾ „	„ 965
6½ „	2¾ „	„ 1,035



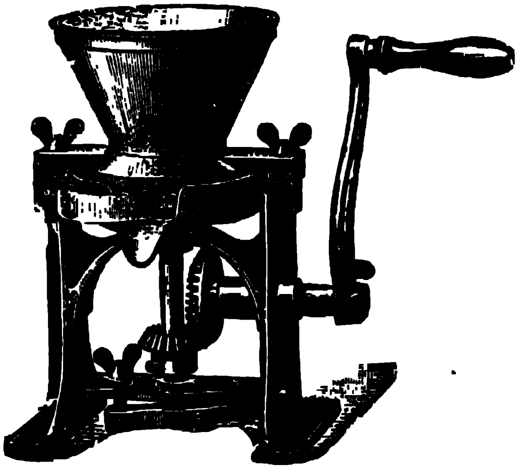
Jewellers' Rollers which have become worn in use can be reground and hardened at moderate charges in our works, or new rollers made up to sample or sketch to fit existing machines.

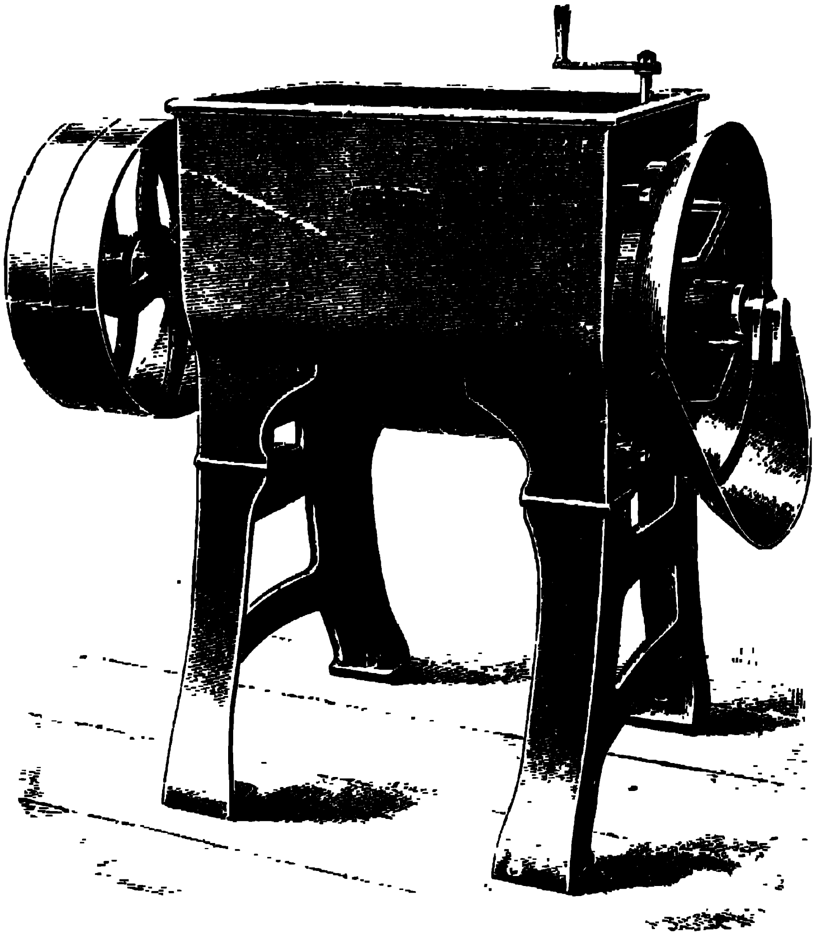
Paint Grinding Mills.

These mills are largely used in the Railway Workshops and have been adopted by most of the Indian Railways.

They are of strong and superior construction, capable of grinding large quantities of paint, and can easily be taken to pieces for cleaning.

Size of Mill.	No.	1	2
Size of Hopper ..	.. ins.	8½	11
Dia. of Grinding Disc	.. „	5	7½
Height	.. „	16	21
Approx. capacity per day	..	2 cwt	4 cwt
Price	**Rs.**	**102**	**145**





These mills have been specially designed for the use of manufacturers and others who require to turn out large quantities of paint. The machine is exceedingly simple and all complications are done away with, and there are no spring scrapers or gearing to get out of order.

The shaft is fitted with suitable Pugging and Mixing Knives which thoroughly amalgamate the colour while it is being ground.

Prices on application.

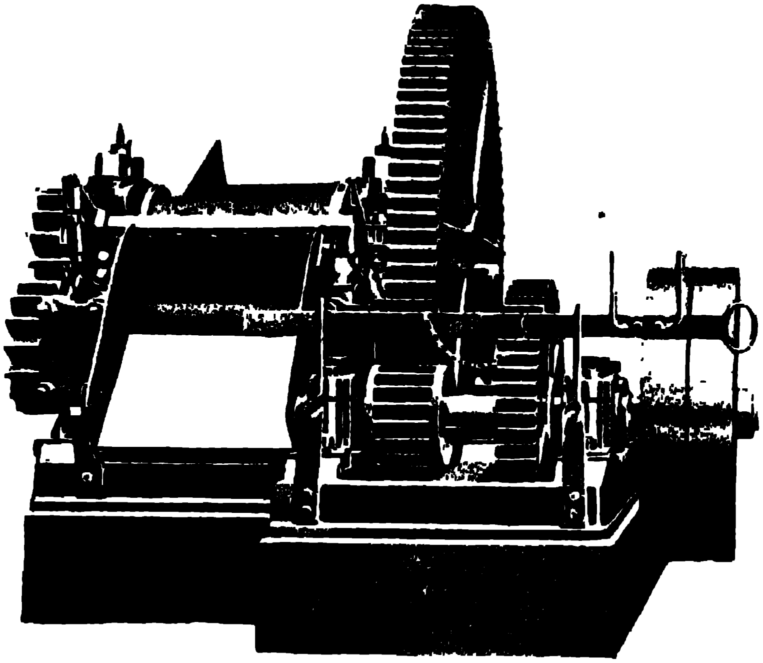
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

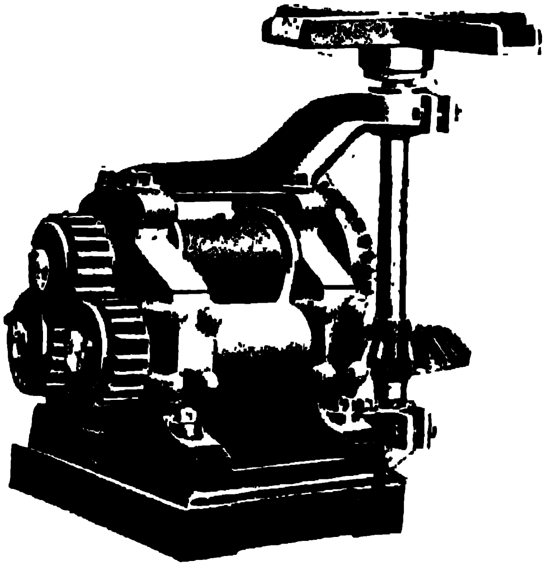
RANGOON, MADRAS, BOMBAY, LONDON.

Sugar Cane Crushing Mills.

Belt or Bullock Driven.



Belt Driven.



Bullock Driven.

The above illustrations show our standard types of Horizontal Three-roller Sugar Cane Crushing Mills arranged for working by animal power, belt driving from overhead countershaft or direct from oil engine, as required

The mills are fitted with feed and delivery tables. The scraper for the top roller as shown in the left hand illustration is only provided by request and at an extra cost.

These mills will crush about 30 per cent. more cane than the quantities given below, but with an increased output the percentage of juice extracted will be reduced. We therefore recommend the outputs as the maximum for efficient working.

Bullock Driven.

Rolls, 16"×24". No. of Bullocks required—4.
Capacity, 3,000 lbs. of cane crushed per hour.

Belt Driven.

Rolls, 12"×18". B. H. P. required—7.
Capacity, 2,000 lbs. of cane crushed per hour.

Prices for above or larger mills on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sugar Machinery.

It is not possible to illustrate and describe fully all the various machines used in the manufacture and preparation of sugar, but for the requirements of small growers of cane who wish to work up their products into ordinary brown sugar or for those intending the installation of large plants for the production of best refined white sugar, we are always prepared to quote for the most suitable machines or plant necessary and solicit enquiries.

Soap Making Machinery.

We shall be pleased to supply specifications of machinery and plant for the manufacture of soap on a small or large scale, from vegetable oils, etc., available in Indian towns. The apparatus is simple in operation and easy to erect.

We shall also be pleased to quote for entire plant for the manufacture of best refined soaps.

Tobacco and Cigarette Machinery.

In view of the importance of the tobacco and cigarette making industry in India and the popularity of this remunerative business we are prepared to submit estimates and specifications for tobacco preparing, cutting, and pressing machines also for cigarette making machines to suit those who desire to start an industry on a modest capital or for large plants to meet the ever growing demand.

Paper Mill Machinery.

We are prepared to quote for a complete mill and plant or separately for Chopping and Cutting Machinery, Rag or Straw Boilers, Bleaching, Glazing, Ripping, Rolling and Winding Machinery and shall be pleased to have enquiries stating the material available and the class and outturn of paper desired.

PUMPS AND PUMPING MACHINERY.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Pumping Data and Calculations.

Hydraulic Equivalents.—One Imperial gallon of water at 62°F. weighs 10 lbs.

One cubic foot of water contains 6.23 gallons and weighs 62.3 lbs.

One inch of water over one acre is equivalent to 22,600 gallons.

Head.—The vertical height through which the water is to be pumped is termed the **static head** and is equal to the sum of the suction and delivery heads.

The "TOTAL" or "MANOMETRIC HEAD" is equal to the static head plus the loss of head due to friction in the suction and delivery pipes. The latter varies according to the length and diameter of the pipe line and to the rate at which the water is flowing. The following table gives the loss in head due to friction for every 100 feet of pipe line:—

Galls. per min.	Diameter of pipe in inches.																
	1	1½	2			3½		5	6				10	12	14	16	18
	4·08	·490	108	·033													
10	16·3	1·96	433	·134	·051												
15	36·8	4·42	·975	·302	·116	·051											
20	65·8	7·90	1·73	·535	·206	·091	·045										
30		17·6	3·89	1·21	·463	207	·103	·032									
40		29·7	6·92	2·14	·824	·367	·183	·056									
50		49·0	10·8	3·36	1·28	·574	·288	·088	·034								
60		70 7	15·5	4·72	1·86	·823	·410	·127	·049								
70		96·2	21·1	6·57	2·52	1·12	·560	·173	·069	·030							
80			27·5	8·60	3·30	1·47	·732	·227	·087	·039							
90			35·0	10·9	4·11	1·86	·927	·286	·109	·049	·024						
100			43·3	13·4	5 15	2·29	1·14	·355	·136	·061	·030						
120			62·2	19·4	7·22	3·30	1·65	·505	·195	·088	·043	·023					
140			84·5	26·3	10·1	4·50	2·27	·700	·288	·119	·055	·032					
160				34·4	13·2	5·89	2·94	·912	·347	·156	·077	·042	·024				
180				43·5	16·8	7·43	3 69	1·15	·443	·197	·097	·054	·033				
200				53·5	20·6	9·18	4·57	1·42	·545	·244	·121	·065	·037				
250				83·8	32·4	14·3	7·20	2·23	·855	·381	·188	·101	·058	·022			
300					46·3	20·7	10·3	3·20	1·22	·548	·271	·146	·084	·032			
350					63·3	28·1	14·0	4·35	1·66	·747	·368	·198	·115	·044			
400					82·4	36·7	18·3	5·67	2·18	·976	·473	·260	·150	·057	·027		
450						46·3	23·1	7·17	2·77	1·23	·611	·328	·189	·073	·035		
500						57 4	28·8	8·86	3·41	1·52	·755	·406	·233	·091	·043	·020	
600						82·3	41·0	12·7	4·91	2·14	1·08	·584	·336	·129	·063	·028	
700							56·0	17·3	6·90	3·00	1·47	·797	·458	·176	·085	·039	·021
800							73·2	22·7	8·70	3·91	1·93	1·04	·600	·231	·112	·051	·027
900							92·7	28·6	10·9	4·95	2·44	1·31	·757	·292	·140	·065	·034
1000								35·5	13·6	6·10	3·01	1·62	·939	·360	·173	·080	043

Suction Limits.—Theoretically a pump will lift water about 34 ft at freezing point but the amount decreases rapidly with rise in temperature until at boiling point no suction lift is possible. Under average Indian conditions the maximum theoretical suction lift is about 30 ft. In practice, even with moderately cold water 25 to 26 ft. is considered the limit but from the point of view of efficiency it is preferable to reduce this as much as possible.

In the case of centrifugal and other high speed pumps the best results are obtained with a suction lift of 15 ft or less.

We recommend in all cases where large areas have to be irrigated that the purchaser should consult his district Agricultural Department before asking us to submit quotations as it is obviously useless to instal a pumping plant of larger capacity than the source of supply available. It is generally necessary to have wells tested before fixing the size of pump to be installed as otherwise the well may be destroyed by forcing it beyond its capacity.

Steam Pumps.—The capacity of a steam pump depends on the diameter of the pump end, the length of stroke and piston speed. The tables of capacities in the following pages are based on 75 ft. per min. in the case of Duplex pumps and 100 ft. in the case of the Special type.

The steam cylinder should be as small as possible having regard to the head against which the pump is to work and the steam pressure available. It does not necessarily follow that because a pump is listed as "300 ft series" that it will pump against this head when supplied with low pressure steam.

The head against which a pump will work is given by the formula—

$$H = \frac{3}{4} P \times \frac{D^2}{d^2} \quad \text{where}$$

H=head in feet.
D=diameter of steam cylinder.
d=diameter of water end.
P=steam pressure at pump.

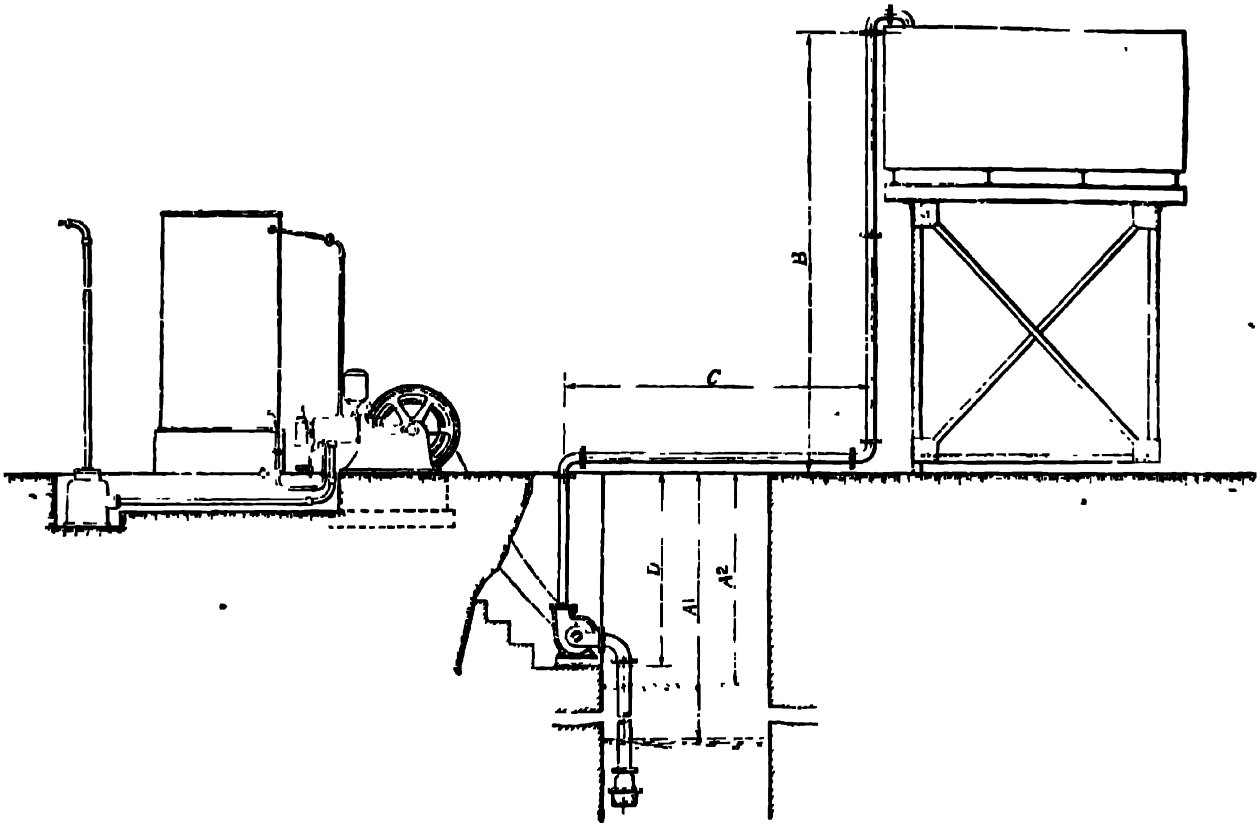
We shall be pleased to recommend the most suitable pump in each individual case.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Particulars Necessary for Pumping Plant Estimates.



In order that we may quote for the most suitable plant for any particular duty, it is essential that we should be in possession of full particulars. Without these particulars there is considerable risk of an unsatisfactory plant being supplied or one more costly than necessary. To assist constituents to furnish these we illustrate diagrammatically a Tangye's Oil Engine and Pump discharging water into an overhead tank. If the duty required is of this nature the following particulars are essential:—

(1) Dimensions " A1 " and " A2 " showing the lowest and highest water levels measured below the surface of the ground.

(2) Dimension " C " showing the length of the delivery pipe. In giving this, the diameter and number of bends and elbows, etc., should also be stated.

(3) Dimension " B " showing the height to which the water is to be lifted above ground level.

(4) The number of gallons of water which are to be pumped per hour.

If the pump is to be used for irrigation the water would be discharged at ground level so that dimension " B " is not required.

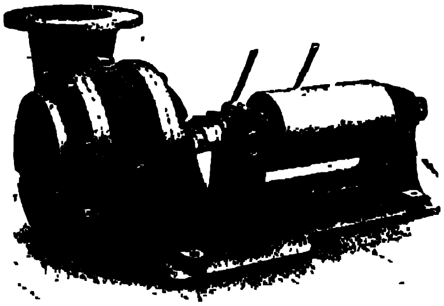
The following additional information is required in this case:—

(1) Area to be irrigated in acres.
(2) Total depth of watering per season.
(3) Number of working days per season.
(4) Usual working hours per day.

The position of the pump as shown by dimension " D " will be given by us when quoting.

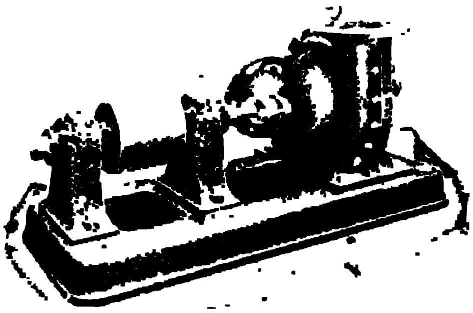
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW; **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

Tangye's "Tan-Gyro" Centrifugal Pumps.



Type A.

The **"Tan-Gyro" Pump,** designed and manufactured by Messrs. Tangyes, Limited, Birmingham, is well known as a simple efficient and reliable pump for all purposes for which rotary pumps are required. We have supplied large numbers of these during the last twelve years for all classes of pumping work in India, for Irrigation, Public Water Supplies and general commercial purposes and the ever-increasing demand testifies to the popularity of the type.



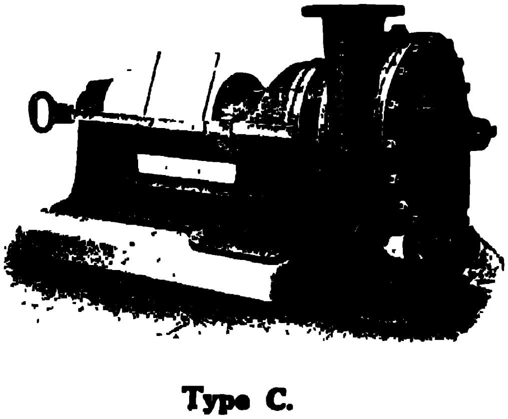
Types B & BX.

The pumps are made in six types, the first four of which are regularly stocked by us. We refer to these as follows:—

Type A.—For medium duties and "heads" up to 35 feet.

Type BX.—Irrigation Type; for maximum quantities and "heads" up to 35 feet.

Type B.—For all purposes and "heads" between 35 and 75 feet.



Type C.

Type C.—For all purposes and "heads" between 75 and 120 feet.

Type LS.—Slow speed type for "heads" up to 35 feet.

Sewage Type.—For all duties, designed with a special view to opening up for inspection.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Tan-Gyro" Centrifugal Pumps.

Type "A" for "Heads" up to 35 Feet.

The **impeller** is of cast-iron, bored and turned, and keyed upon a steel spindle. The **spindle** runs in a long gun-metal bush and stuffing box with gun-metal gland—the ingress of air at the gland being prevented by a **water-sealed chamber.** The **bearings in the standards** are made of cast-iron, and are renewable; they are provided with **ring lubrication,** and the standard has a large oil well with overflow and drain plug. The oil well is covered by a bright cast-iron cap secured by a chain.

The **volute** or pump casing is bolted to the circular bracket on the bedplate, and is fitted with a plug for charging the pump, also a drain plug The **bedplate** is of strong box section, and provided with bosses for the holding-down bolts.

A suitable cast-iron turned belt-pulley is provided, and in the case of fast and loose pulleys, belt shifting gear is also fitted. A set of spanners is supplied with the pump, together with sufficient packing for the stuffing-box

The Type "A." Pump can be supplied in the following forms:—

With single overhung pulley. With single pulley and two bearings. With fast and loose pulleys and two bearings. With single bearing and half coupling for motor drive and extended bedplate to take motor.

Tables of Normal Capacities.

Size of Pump .. **ins.**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Suction and Delivery. dia. ins.	2	3	4	5	6	7	8	9	10	11	12
Diameter of Inlet on Suction Bend .. ins.	3	4	5	7	8	9	10	11	12	14	15
Pulleys—diameter .. "	4	4	4	5	7	8	10	12	13	15	18
" width "	3½	3½	4½	4½	4½	6⅜	7	8	9	10¼	11½

Prices and Normal Capacities in Gallons per Minute.

At 35 feet head	**60**	**140**	**250**	**400**	**550**	**750**	**1000**	**1250**	**1550**	**1850**	**2400**
" 30 " "	**55**	**130**	**230**	**370**	**520**	**700**	**920**	**1160**	**1430**	**1750**	**2200**
" 25 " "	**50**	**120**	**210**	**340**	**475**	**650**	**850**	**1080**	**1320**	**1600**	**2000**
" 20 " "	**45**	**110**	**190**	**310**	**430**	**590**	**780**	**980**	**1200**	**1450**	**1800**
" 15 " "	**40**	**100**	**170**	**275**	**380**	**520**	**700**	**860**	**1060**	**1300**	**1600**
" 10 " "	**35**	**90**	**150**	**230**	**320**	**450**	**600**	**720**	**900**	**1100**	**1400**
Brake H.P. at Max "Head"	1½	2¾	5	7½	10	13	17	20	23	28	36
Weight with one pulley and two standards cwts.	1½	1½	2	2½	3	4½	5½	8	9¼	12¾	15½
Weight with two pulleys and two standards cwts.	1¾	1¾	2¼	2¾	3½	5	6	9¼	10½	14¼	17½
Prices—Single Pulley Rs.	**215**	**240**	**285**	**330**	**400**	..	**580**	...	**845**	..	**1,[illegible]35**
" Double " "	**265**	**290**	**340**	**385**	**480**	..	**690**	..	**1,000**	..	**1,455**
" Suction Bends "	**17**	**17**	**17**	**23**	**28**	..	**44**	..	**55**	..	**75**

Prices of single pulley pumps are with two bearings as stocked.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

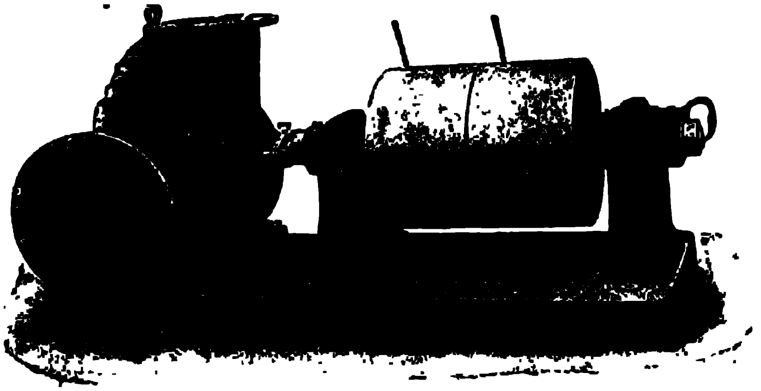
Tangye's "Tan-Gyro" Centrifugal Pumps.

The BX. (High Capacity) Type for "Heads" up to 35 ft.

When employed on very low "heads," the ordinary centrifugal pumps have a very low rate of output, and if the quantity delivered is augmented by an increase in the speed, the efficiency of the pump falls off rapidly. The "BX." type pump has been specially designed to overcome this difficulty, which it does successfully, pumping large volumes of water on low "heads" at high efficiency.

It should be specially noted that the pump volute is well supported against any shock due to water hammer action caused by breakage of belt or inequality of drive. The pump is specially recommended for irrigation pumping.

The **impeller** is of cast-iron, bored and turned, and keyed upon a steel spindle. The **spindle** runs in two gun-metal bearings in the pump casing or volute, and is provided with a **water-sealed gland** to prevent the ingress of air. The **bearings in the standards** are made of cast-iron, and are renewable; they are provided with **ring lubrication** and the standard has a large oil well with overflow and drain plug. The oil well is covered by a bright cast-iron cap secured by a chain.



12 ins. size, two standards and two pulleys.

This pump is of the **double-suction type,** *i.e.*, the inlet water enters the impeller on both sides. The **volute** or pump casing is divided through the centre; this form of construction is preferred in some countries as affording greater facilities for transport and for repair, and the standard is made separate from the base with the same object. A plug for charging the pump is fitted, also a drain plug.

A suitable cast-iron turned belt pulley is provided; and in the case of fast and loose pulleys, belt-shifting gear is also fitted. A set of Spanners is supplied with the pump, together with sufficient packing for the stuffing-box

Position of Branches:—It should be noted that with this form of pump only the position shown in the illustration can be offered.

The BX. (Irrigation Type) for "Heads" up to 35 feet.

Size of Pump . .. ins.	3	4	5	6	8*	8	10	12
Suction, diameter .. ins.	4	5	7	8	10	10	12	14
Delivery „ . „	3	4	5	6	8	8	10	12
Pulleys „ . . „	5	7	8	9	12	12	15	20
„ width . „	3½	4½	6	6	8	8	10½	12½

Prices and Normal Capacities in Gallons per Minute.

At 35 feet head .. .	240	420	630	960	1350	1660	2800	4050
„ 30 „ „ . ..	230	390	600	910	1290	1600	2650	3800
„ 25 „ „	215	365	550	850	1210	1500	2500	3550
„ 20. „ „ ..	205	340	500	800	1120	1400	2300	3300
„ 15 „ „ .. .	185	315	450	715	1000	1250	2070	2950
„ 10 „ „ .	160	270	400	620	880	1100	1810	2600
„ 5 „ „ ..	130	220	330	500	710	900	1480	2100
Break H. P. at Max. "Head" .	5	7½	12	18	24	32	46	67
Weight of pumps fitted with two pulleys . cwts.	2½	3¼	4	5¼	9½	9½	16	26
Price, as above . **Rs.**	370	460	540	645	980	980	1,450	2,115

*** 8 inches Pump with special impellers.**

Note.—We usually stock these pumps fitted with fast and loose pulleys and belt shifters. Single pulley pumps and pumps fitted with a coupling for motor drive can also be offered.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Type BX. "Tan-Gyro" Pumps.

Capacities, Speeds and Powers for 14 to 30 inches Sizes.

Size of Pump, ins.		14			16			18			21		
"Head," in feet.		Galls. per min.	Revs. per min.	B.H.P.	Galls. per min.	Revs. per min.	B.H.P.	Galls. per min.	Revs. per min.	B.H.P.	Galls. per min.	Revs. per min.	B.H.P.
35	No 2 IMPELLER.	5550	421	81	7200	382	109	9200	338	134	12200	306	182
34		5500	414	78	7100	376	104	9100	334	129	12100	304	175
32		5400	402	73	6950	365	96	8900	322	118	11900	296	162
30		5250	390	66	6800	356	88	8700	313	106	11600	286	146
28		5120	376	60	6650	344	79	8500	303	96	11300	277	131
26		4980	364	54	6450	332	72	8200	292	86	11000	267	118
24		4830	351	48	6250	319	64	8000	281	77	10600	257	105
22		4650	336	43	6050	307	56	7700	269	68	10200	247	95
20		4500	321	38	5800	292	49	7400	257	59	10000	236	85
18		4350	307	33	5600	278	42	7200	245	52	9600	227	73
16		4150	290	28	5400	265	36	6900	233	45	9200	218	62
15		4070	282	26	5250	257	33	6700	226	41	9000	210	57
15	No. 1 IMPELLER.	5200	324	33	6650	295	43	8700	246	53	11900	217	73
14		5100	315	30	6500	286	39	8500	239	49	11600	210	66
13		4950	306	28	6300	276	35	8300	231	44	11300	205	60
12		4800	294	25	6100	267	32	8000	222	39	10900	198	54
11		4650	284	22	5950	258	28	7800	214	35	10600	190	48
10		4450	271	19	5700	246	25	7500	205	31	10000	182	42
9		4300	259	17½	5500	235	21	7200	195	27	9800	174	37
8		4150	246	14½	5300	225	18¼	6900	185	23	9300	166	31
7		3950	232	12½	5000	209	15	6600	175	19½	8900	155	27
6		3700	217	10¼	4700	195	12¼	6200	163	15½	8500	146	22
5		3450	199	8	4400	179	9½	5750	148	12¼	7900	134	17
4		3150	181	6	4000	161	7	5200	136	9	7200	120	12½

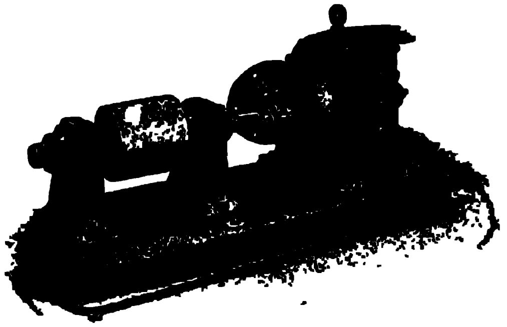
Size of Pump, ins.		24			27			30		
"Head," in feet.		Galls. per min.	Revs. per min.	B.H.P.	Galls. per min.	Revs. per min.	B.H.P.	Galls. per min.	Revs. per min.	B.H.P.
35	No. 2 IMPELLER.	16600	260	236	21000	237	302	24300	214	356
34		16400	256	227	20800	234	286	24100	211	340
32		16100	250	210	20200	227	262	23700	205	310
30		15700	242	192	19700	220	236	23300	200	282
28		15300	234	173	19100	213	212	22800	193	253
26		14900	225	155	18600	205	190	22200	187	224
24		14500	218	139	18000	198	168	21600	180	201
22		13900	210	123	17400	190	149	20800	173	179
20		13500	200	110	16800	182	131	20000	163	156
18		13000	190	96	16200	175	115	19300	157	135
16		12500	181	82	15500	165	99	18500	150	117
15		12200	176	75	15200	160	91	18000	144	108
15	No. 1 IMPELLER.	15800	192	95	19700	175	118	23300	162	142
14		15500	186	87	19300	170	109	22800	157	127
13		15000	179	78	18700	165	96	22200	152	114
12		14500	172	70	18000	158	85	21500	146	102
11		14000	165	63	17500	152	75	20700	140	89
10		13500	158	55	16800	145	65	20000	135	78
9		13000	151	48	16200	138	57	19300	128	68
8		12500	142	41	15500	132	49	18500	122	59
7		11800	134	34	14900	125	42	17600	114	49
6		11200	126	28	13800	116	34	16700	106	40
5		10500	116	22	13000	107	27	15500	98	32
4		9500	105	16	11500	94	19¼	14000	88	24

NOTE.—These Pumps can also be offered fitted with special impellers making them suitable for heads between 35 and 50 feet.

Prices of above pumps on application.

Tangye's "Tan-Gyro" Centrifugal Pumps.

Type B. for "Heads" up to 75 feet.



The construction of the Type B. Pump is generally the same as that of the Type BX. already described.

Size of Pump .. **ins.**	**2**	**3**	**4**	**5**	**6**	**8***	**8**	**10***	**10**	**11**	**12**
Suction inlet, diameter ins.	3	4	5	7	8	10	10	12	12	14	15
Delivery outlet „ „	2	3	4	5	6	8	8	10	10	11	12
Pulley, diameter .. „	4½	5	7	8	9	12	12	15	15	18	20
„ width .. „	2¼	3½	4½	6	6	8	8	10½	10½	10½	12½

Prices and Normal Capacities in Gallons per Minute.

At **75** feet head ..	**70**	**150**	**300**	**500**	**700**	**1000**	**1300**	**1700**	**2100**	**2500**	**3000**
„ **70** „ „ ..	**68**	**145**	**290**	**485**	**680**	**980**	**1250**	**1650**	**2050**	**2430**	**2900**
„ **65** „ ..	**66**	**140**	**280**	**470**	**650**	**950**	**1220**	**1600**	**1980**	**2350**	**2800**
„ **60** „ „ ..	**64**	**135**	**270**	**450**	**630**	**900**	**1180**	**1550**	**1900**	**2280**	**2700**
„ **55** „ „ ..	**62**	**130**	**260**	**435**	**600**	**860**	**1130**	**1480**	**1820**	**2200**	**2600**
„ **50** „ „ ..	**60**	**125**	**250**	**420**	**580**	**825**	**1080**	**1400**	**1750**	**2100**	**2500**
„ **45** „ „ ..	**58**	**120**	**240**	**400**	**560**	**800**	**1025**	**1350**	**1650**	**2000**	**2400**
„ **40** „ „ ..	**56**	**110**	**225**	**375**	**530**	**750**	**970**	**1275**	**1580**	**1900**	**2250**
„ **35** „ „ ..	**54**	**105**	**210**	**350**	**490**	**700**	**900**	**1200**	**1500**	**1800**	**2150**
B.H.P. at Max. "Head"	3½	7	13	21	29	36	45	58	70	80	91
Weight with two pulleys cwts.	1½	2½	3¼	4	5½	9½	9½	16	16	21	26
Price .. **Rs.**	**330**	**355**	**445**	**520**	**620**	....	**945**	....	**1400**	....	**2045**

* **8 inches and 10 inches Pumps with special impellers.**

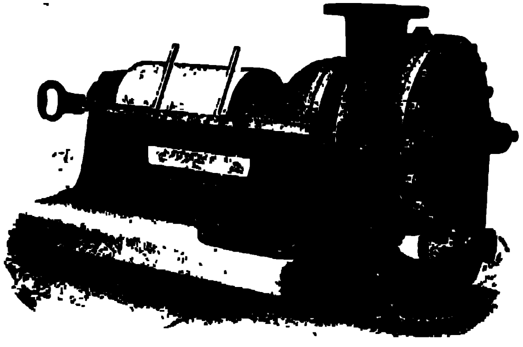
Pumping Enquiries.

Buyers are advised to refer to the notes at the beginning of this section before selecting or ordering pumps. It is most important that full particulars should be given in order that a suitable proposal can be submitted. Many enquiries only ask us to quote for, say a six-inch centrifugal pump with an engine to drive it. In such cases the number of possible alternatives both for output of pumps, head against which it will work and power required to drive the pump are so many that it is quite impossible to deal with the enquiry without making further references.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW. **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

Tangye's "Tan-Gyro" Centrifugal Pumps.

Type C. for "Heads" up to 120 feet.



7 ins. size, two standards and two pulleys.

Size of Pump				4	5	6	8*	8	10*	10	12†	12†
Suction inlet, diameter	ins.	3	4	5	7	8	10	10	12	12	15	15
Delivery outlet ,,	,,	2	3	4	5	6	8	8	10	10	12	12
Pulleys, diameter	,,	6	7	8	9	12	16	16	20	20	24	24
,, width	,,	4½	4½	6	6	6	10½		12½	12½	21	21

Prices and Normal Capacities in Gallons per minute.

At **120** feet head	**60**	**150**	**300**	**500**	**650**	**950**	**1350**	**1700**	**2100**	**2500**	**3000**
,, **115** ,, ,,	**58**	**147**	**295**	**490**	**640**	**940**	**1330**	**1675**	**2050**	**2450**	**2950**
,, **110** ,, ,,	**56**	**144**	**290**	**480**	**625**	**920**	**1300**	**1650**	**2000**	**2400**	**2900**
,, **105** ,, ,,	**54**	**140**	**280**	**470**	**610**	**890**	**1270**	**1600**	**1960**	**2350**	**2850**
,, **100** ,, ,,	**52**	**138**	**275**	**460**	**600**	**875**	**1240**	**1550**	**1920**	**2300**	**2750**
,, **95** ,, ,,	**50**	**135**	**270**	**450**	**580**	**850**	**1200**	**1525**	**1875**	**2250**	**2700**
,, **90** ,, ,,	**48**	**130**	**260**	**440**	**570**	**830**	**1175**	**1500**	**1830**	**2160**	**2650**
,, **85** ,, ,,	**46**	**127**	**255**	**425**	**550**	**820**	**1140**	**1450**	**1800**	**2120**	**2550**
,, **80** ,, ,,	**44**	**125**	**250**	**410**	**540**	**790**	**1120**	**1400**	**1750**	**2660**	**2500**
,, **75** ,, ,,	**42**	**120**	**240**	**400**	**520**	**760**	**1080**	**1360**	**1680**	**2000**	**2400**
B.H.P. at Max. "Head"		11	19	30	38	50	75	90	108	124	145
Weight with two pulleys cwts.	3¾	4	†4¾	8	10	19½	19½	33½	33½	52½	52½
Price Rs.	**550**	**575**	**650**	**850**	**1050**		**1725**		**2540**		**4250**

***Pumps fitted with special impellers. † Fitted with single pulleys only.**

This pump is designed for high lifts with a single impeller. It is suitable for "heads" up to 120 ft. when driven by belt pulley; but when direct coupled to an electric motor it is suitable for 150 ft. "head"

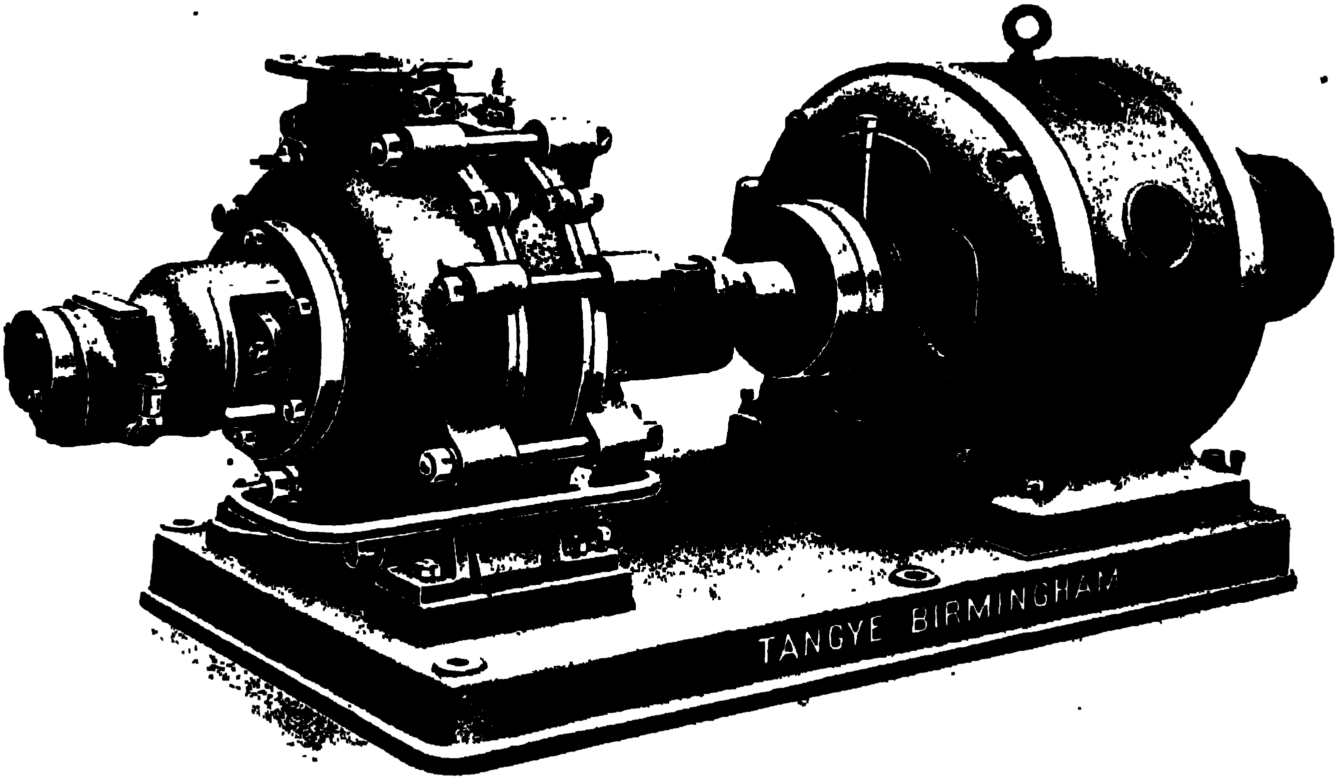
The impeller is of cast-iron, bored and turned, and keyed upon a steel spindle. The spindle runs in two brass bearings in the pump casing or volute, and is provided with a water-sealed gland to prevent the ingress of air. The bearings in the standards are made of cast-iron, and are renewable; they are provided with ring lubricator, and the standard has a large oil well with overflow and drain plug. The oil well is covered by a bright cast-iron cap secured by a chain. This pump is of the double-suction type.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye ' Multi-Turbine Pump.



We illustrate a Tangye multi-turbine two-stage pump direct coupled to a 38¼ B.H.P. motor designed to deliver about 20,800 gallons of sea water per hour against a total head of 251 feet when running at 1,900 revs. per minute.

The Tangye multi-turbine pump consists in effect of a number of centrifugal pumps through which the water flows in series. In its passage through the first stage of the multi-turbine (that is through the first pump of the series) a certain increase in pressure energy is imparted by the rotating impeller to the liquid. After leaving the impeller of the first stage the liquid flows through carefully proportioned guide passages which transform any residual velocity energy contained in the water into useful pressure energy, with the minimum of loss. The water then flows through channels in the casing into the eye of the second impeller where further energy and further pressure is imparted to it; and so on. If for instance the impeller of the first stage imparts to the water energy corresponding to a head of, say, 100 feet then if the pump is of three stages each impeller will impart the same increment in energy to the water which will therefore emerge from the pump at a pressure. corresponding to 300 feet head; and a similar six-stage pump will deliver against a head of 600 feet.

" If the speed of rotation and the quantity of water delivered are increased or decreased in exact proportion then the head against which the pump delivers, varies in the ratio of the squares of the speeds of rotation, the power absorbed varies in the ratio of the cube of the speed and the efficiency remains constant."

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,	**JESSOP & CO. LTD** ENGINEERS	RANGOON, MADRAS, BOMBAY, LONDON.

Tangye Multi-Turbine Pump.

As an example to the foregoing, according to the table below the 4 B.T. size Pump has the following capacities:—

215 gallons p.m. against 82 feet total head per stage when running at 1.450 revs. p.m. and absorbing 7.8 B.H.P. per stage.

When running under the same conditions of efficiency at say 1 600 revs. per minute the capacity of the same pump is as follows:—

215 G. P. M. $\times \frac{1600}{1450}$ = 237 G. P. M. against

82 feet $\frac{(1600)^2}{(1450)}$ = 100 ft total head per stage when running at 1.600 revs. per minute and absorbing

7·8 B.H.P. $\times \frac{(1600)^3}{(1450)}$ = 10.5 B.H.P. per stage.

The Table of Capacities is intended as a guide only as each case is dealt with on its merits and when the conditions indicate that a pump of higher efficiency or more satisfactory operation is possible by a departure from our standard range, the maker's design special impellers to suit the particular set of conditions.

Table of Capacities.

Size	Bore of Suction Branch.	Bore of Delivery Branch.	Speed R P M.	Discharge G.P M.	Head per stage feet.	Power absorbed per stage B.H.P.
2½ AT	3"	2½"	1450*	80 110	28 23	1·15 1·30
2½ BT	3"	2½"	"	105 145	34 29	1·75 2·05
3 AT	4"	3"	"	125 165	43 36	2·55 2·8
3 BT	4"	3"	"	135 185	54 45	3·4 3·8
4 AT	5"	4"	"	155 205	64 53	4·5 5·0
4 BT	5"	4"	"	215 300	82 68	7·8 9·0
5 AT	6"	5"	"	350 465	81 67	12·5 13·7
5 BT	6"	5"	"	410 550	106 88	19·0 21·0
6 AT	8"	6"	"	550 670	111 98	26·5 28·5
6 BT	8"	6"	"	640 780	140 123	38·0 41·0
8 AT	10"	8"	"	800 1100	150 132	56·0 60·5
8 BT	10"	8"	"	1100 1380	180 158	82·5 91·0
10 AT	12"	10"	"	1420 1750	195 172	114 125
10 BT	12"	10"	"	1580 1930	240 210	156 168

*The above capacities are based on the common motor speed of 1.450 R.P.M.

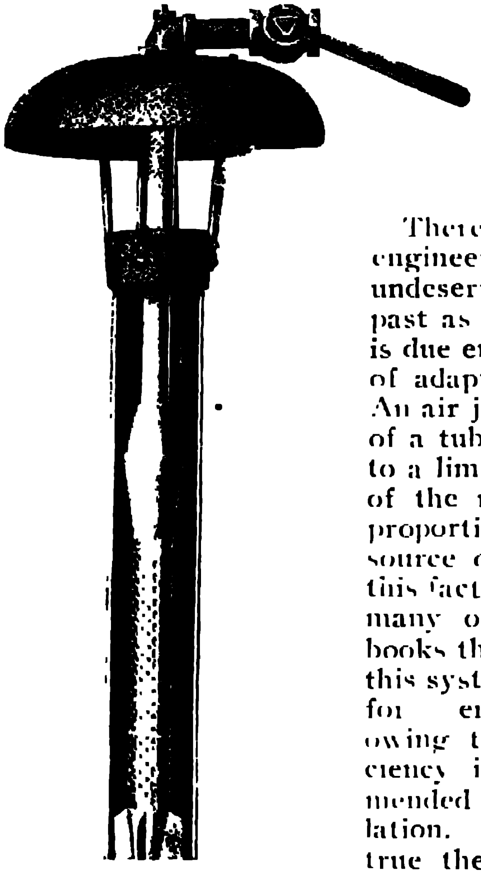
Detail specification on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEE

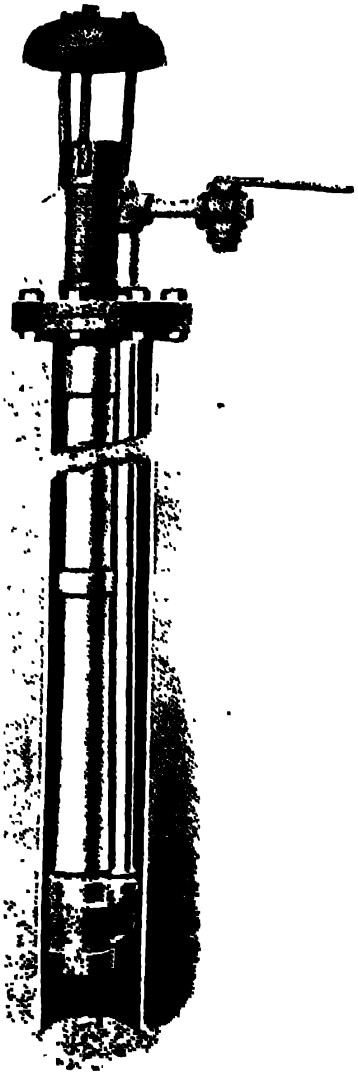
RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Air Lift Pumping System.



Sullivan Central Foot Piece and Umbrella Well Top, the discharge pipe is not a part of the equipment.

There is no other branch of engineering that has been so undeservedly condemned in the past as air lift pumping. This is due entirely to the simplicity of adaptation of the principle. An air jet placed at the bottom of a tube well will raise water to a limited amount regardless of the manner of application, proportioning of areas or the source of supply. Because of this fact you will find in a great many of the older reference books the statement that while this system is readily adaptable for emergency conditions owing to its low overall efficiency it is not to be recommended for a permanent installation. This was undoubtedly true then, but at the present time owing to improvements in application, and care in installation, it has become an important factor in furnishing pure water, handling sewage, acids, and semi-fluid substances.



Sullivan Standard Foot Piece and Well Top, showing relative location of casing, flanges, etcetera.

We have not the space to go into the matter in detail, but we wish to call attention to the important advantages of Air Lift Pumping, when properly applied and to show how Sullivan engineering and Sullivan equipment secure a high degree of effectiveness in this field.

The Air Lift Department of the Sullivan Company embodies a separate corps of engineers, whose efforts are devoted solely to problems relating to pneumatic pumping. We have a member of the Sullivan organization associated with us, and we would urge those interested in water supply from deep wells to submit their requirements and conditions to us.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Sullivan Air Lift Pumping System.

Among the advantages of pneumatic pumping may be noted:—

(1) **Quantity:**—More water can be secured from the same wells than by any other system.

(2) **Quality:**—Improvement in the character of the water, due to aeration, as to purity and solubility.

(3) **Temperature:**—Reduction in temperature, due to absorption of the heat in the water by the air.

(4) **Durability and Simplicity:**—There are no moving parts in the well.

(5) The apparatus is always in order and is not affected by mud, grit, floating sand or by long shut downs

(6) **Sustained Efficiency.**—For further details write for **Bulletin No. 371-G.**

Standard Type Sullivan Air Lift Pump.

Nominal Pump and Size Dis. Ins	Approx Capacity Galls per Minute	Smallest Well Casing adapted Ins	Price			
			Foot Piece.	Well Top	Umbrella or Elbow	Complete Pump.
			Rs.	Rs.	Rs.	Rs.
1½	16	4	400	135	60	537
2	40	5	530	175	75	705
2½	60	6	635	175	75	835
3	80-120	6	665	225	100	890
3½	120-160	8	725	250	125	975
4	160-240	8	785	275	125	1060
4½	240-280	8	855	300	175	1155
5	280-400	10	915	325	175	1240
6	400-600	12	1055	350	250	1405
7	600-800	14	1290	375	250	1665
8	800-1000	14	2450	425	250	2875
10	1000-1600	..	2840	535	375	3375
12	1600-2400	..	3225	650	375	3875

Central Type Sullivan Air Lift Pump.

Discharge Ins. and Pump No.	Approx. Capacity Galls per Minute.	Smallest Well Casing adapted. Ins.	Price			
			Foot Piece	Well Top	Umbrella or "Y" Bend.	Complete Pump.
			Rs.	Rs.	Rs.	Rs.
1½	12-24		140	135	60	275
2	24-40		190	175	75	365
2½	40-56		200	200	75	400
3	56-80		275	225	100	500
3½	80-120		335	250	125	585
4	120-160		375	275	125	650
4½	160-200		425	300	165	725
5	200-240		475	325	165	800

Larger sizes made up to 2,600 gallons per minute. Prices on application.

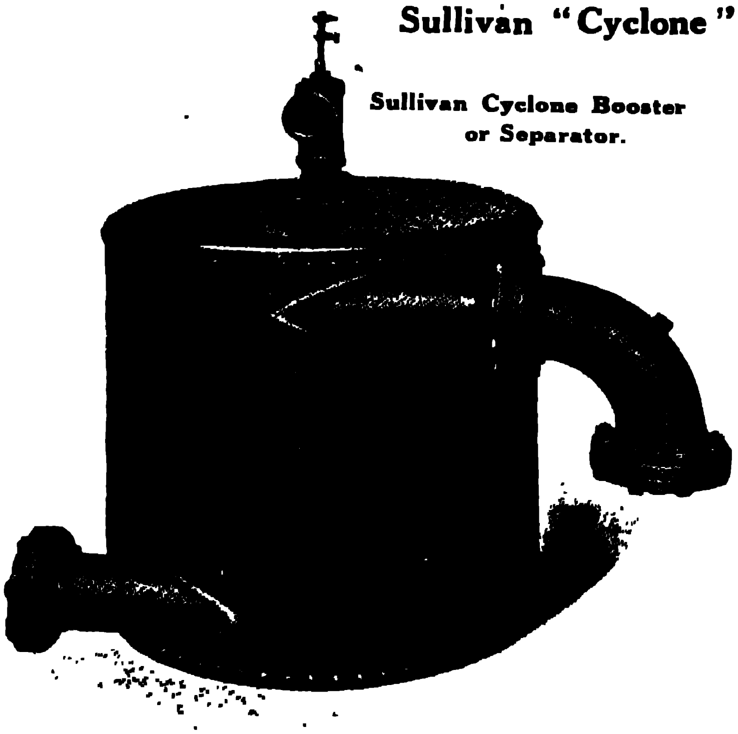
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

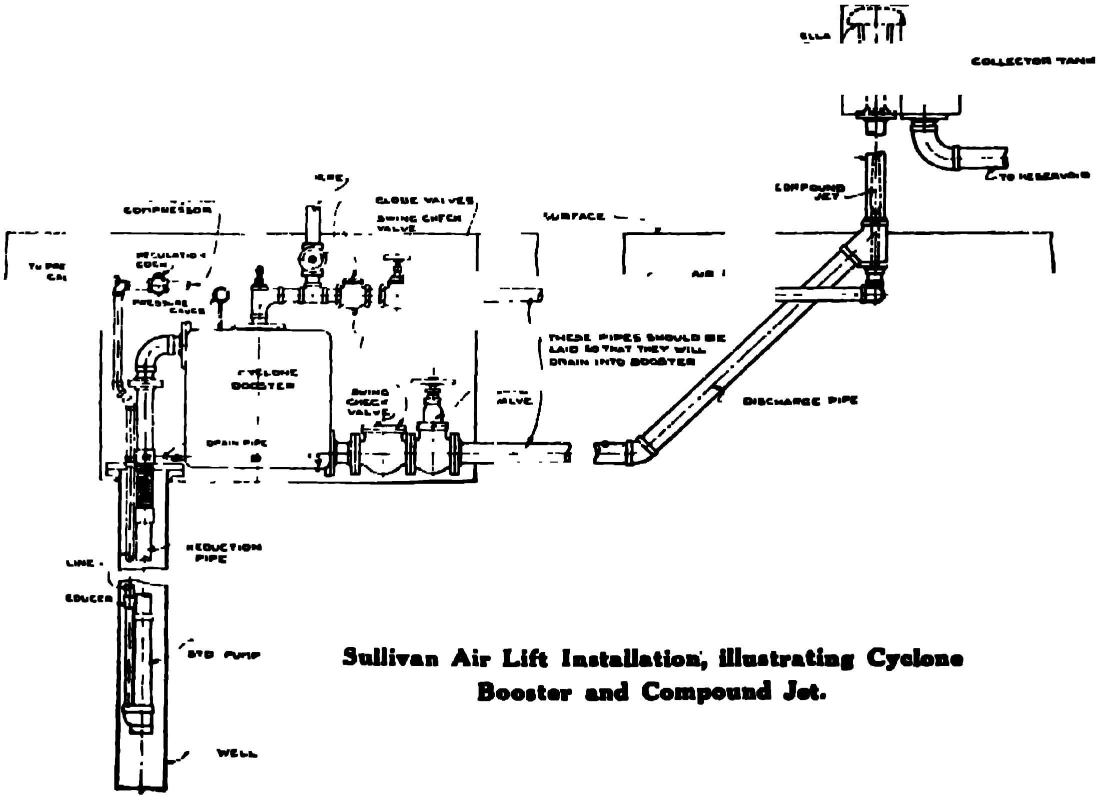
Sullivan Air Lift Pumping System.

Sullivan "Cyclone" Booster.



Sullivan Cyclone Booster or Separator.

For installations where the point of discharge is some distance away from the well head it is necessary to use the **Sullivan Cyclone Booster** (see illustration) in conjunction with the Air Lift Pump. This consists of a closed cylindrical tank, water is discharged into it from the well at the top and at a tangent to the periphery. This imparts a swirling motion to the water effecting a perfect separation, by centrifugal force, of the air and the water. The water leaves the booster at the bottom by an outlet also at a tangent to the periphery, the air passing out through the valve at the top. In this manner the flow of the water is deflected into the desired direction with as little loss of kinetic energy as possible. It also makes it possible to use the air again in an auxiliary jet in lifting to the required elevation (see diagram.)



Sullivan Air Lift Installation, illustrating Cyclone Booster and Compound Jet.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Sullivan Air Lift Pumping System.

Information needed for an estimate on Air Lift Pumping.

1 Number of wells ....
2 Depth, feet ....
3 Depth cased, feet ....
4 Is casing airtight? ....
5 Diameter of well, inches ....
6 Diameter of Standard pipe, inches ....
  Diameter of Casing, inches ....
7 If Reduced
  Diameter, inches ....
  Depth to, feet ....
8 Further reduction
  Diameter, inches ....
  Depth to, feet ....
9 Character of water strata
  (G) Gravel ....
  (S) Sand ....
  (R) Rock ....
10 Depth to water strata, feet ....
11 Strainer
  Make ....
  Inside diameter, inches ....
  Length, feet ....
  Depth to top, feet ....
12 Static head (water level not pumping), feet ....
13 If well flows (gal. per min.) ....
14 If well pumped (gal per min.) ....
15 Gallons per minute required ....
16 Pumping head (water level when pumping), ft ....
17 Kind of pump used
  Suction ....
  Deep Well ....
  Air Lift ....
18 Pump
  Diam. cylinder or working bbl., ins. ....
  Length of stroke, inches ....
  (Stroke) or (Rev.) per min ....
  Depth (working bbl. or suction lift) ft ....
19 Air Lift
  Make ....
  Diam. water discharge in well, ins ....
  Length water discharge in well, ft ....
  Diam. air line in well, inches ....
  Length air line in well, feet ....
  Starting pressure, pounds ....
  Running pressure, pounds ....
20 Elevation above surface, feet ....
21 Horizontal distance well to discharge, feet ....

---

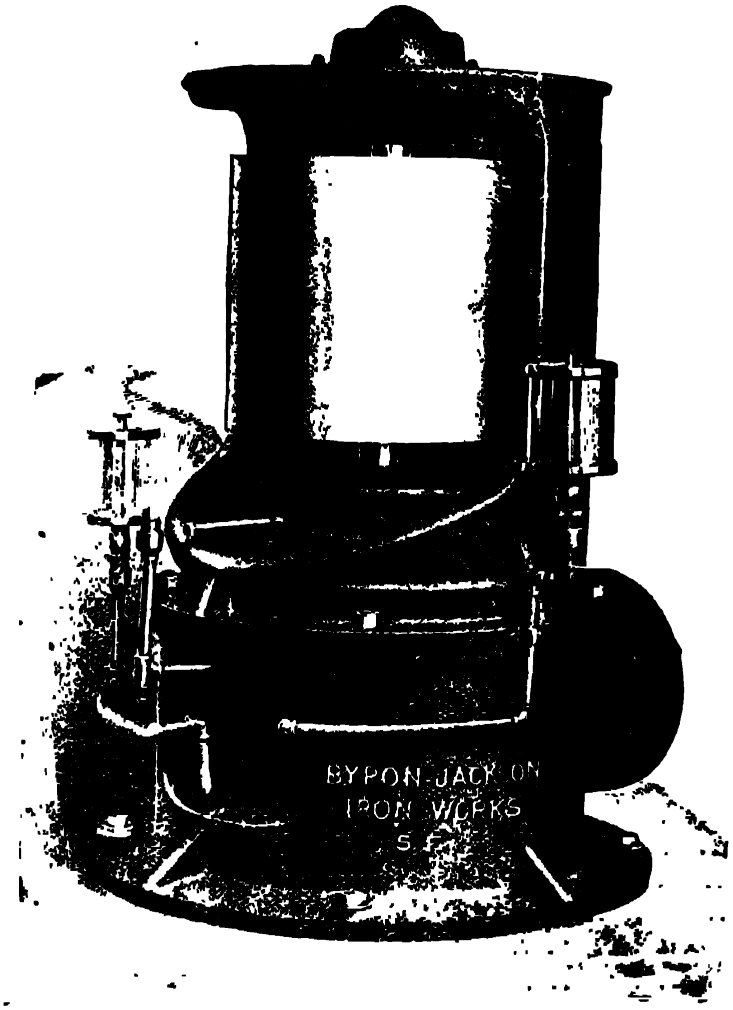
22 Compressor—Make ...., (Steam) or (Belt), Diam. Air Cyl ...., Stroke Air Cyl .... Speed ....
23 Working steam pressure ...., Available boiler H. P ....
24 Electric current, (AC) or (DC), Voltage ...., Phase ...., Cycle ....
25 Gas Engine—Make ...., H. P ...., Speed ....
26 Make Sketch below showing location of wells, reservoir and compressor.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Deepwell Turbine Pumps.



Pulley Head of B. J. Pump.

The problem of raising water from deep wells for irrigation, municipal water supplies and industrial purposes is one which has been in the past so difficult to solve that in many cases it has been impracticable to carry out schemes owing to the prohibitive cost of the pumping plant itself and the well in which it has to be placed.

It is well-known that in cases where the underground water supply is not more than 25 or 30 feet below the surface, a cheap and efficient centrifugal pump can be installed driven by an engine located at or near ground level.

When however the water level is 40 to 100 feet below ground it is impossible to arrange a satisfactory drive to a centrifugal pump, which must be placed within 20 feet of the lowest water level and the only alternative is an expensive—and generally less efficient—reciprocating pump worked by rods. This type may cost as much as six times that of a centrifugal pump of equal capacity while it also needs a sump of reasonable diameter, so that working parts below ground can be inspected.

The Byron Jackson Deepwell Turbine Pumps which we illustrate have the following advantages for well work which are possessed by no other design of pump:—

(1) Drive from surface.

(2) Suspension from specially designed pulley frame located over the well.

(3) Minimum space required in well. Any size will go in a tube well of moderate diameter (see table) and no masonry well work is necessary.

(4) No well fixings and no trouble in lining up shafting and drive.

(5) Minimum power required to drive owing to efficient design of pump.

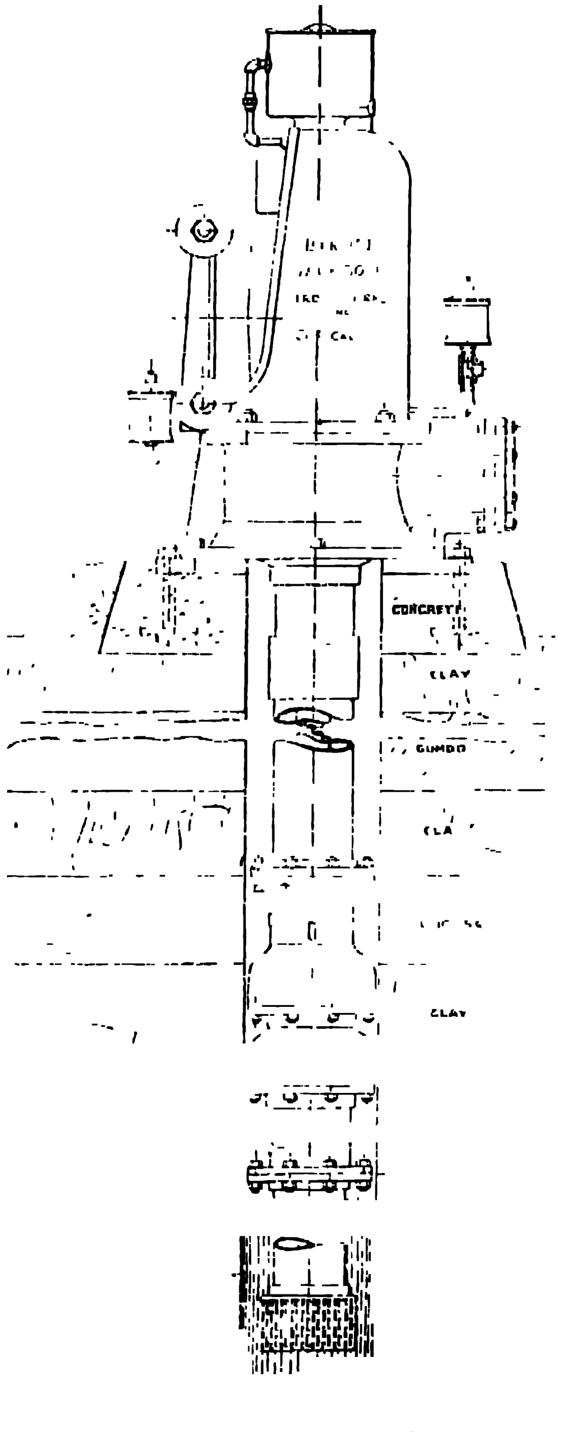
(6) Moderate cost.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON.

General Description of the Byron Jackson Deepwell Turbine Pump.



General Arrangement of Jackson Deepwell Turbine Pump placed in a Well.

The Byron Jackson Pump for which we are sole agents represents the experience of 20 years in design of pumps of this type. The following is a brief description:

The Pump consists of one or more stages, of suitable diameter, capable of entering bored wells, each particular pattern having its own range of capacity, over which it can be economically used.

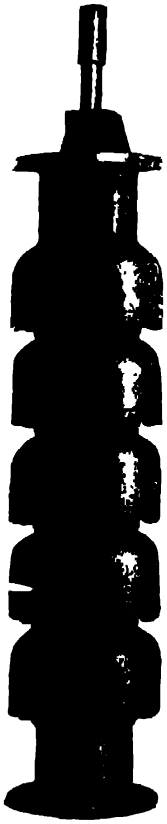
The water enters the bottom of the lower stage at proper velocity, is there received by the rotating impeller, which is of the enclosed type, carefully machined and balanced, and the velocity head thus created is converted into pressure head in the diffuser above the impeller, so that the water enters the second and any of the successive stages at about the same velocity as it enters the lower stage.

The pump shaft proper is guided within the suction mouth in a bronze sleeve bearing, surrounded by a grease chamber, and there is fitted a patented sand cap, to protect the top of the sleeve against the entrance of sand and grit. The upper end of the pump shaft proper is guided in the upper pump bearing, and in case of numerous stages, which are sometimes required for heavy heads, intermediate bronze sleeves are fitted, to insure the absolute, true and smooth operation of the pump

The recess in the stages, for the reception of the suction ring on the impellers, are fitted with special, hard cast-iron renewable wearing rings, so that in case of excessive sand these may be readily renewed and the impellers trued up to fit, thus easily bringing the pump up to its original efficiency, even after considerable abuse.

(Write for separate section list giving detailed description of the Byron Jackson Pump.)

Deepwell Turbine Pump—General Description.



Pump Column.

The pump column consists of an extended shaft supported from the surface, fitted with screwed steel couplings.

The shaft is suitably guided to insure perfect and smooth operation within all reasonable speeds, and is made of very ample size to resist whipping and deterioration.

The discharge pipe on all of the standard sizes is made out of screwed, lap-welded casing, of ample diameter, providing a continuous, undisturbed passage for the water from the pump to the discharge casting at the surface.

The pumps are generally furnished with one length of suction pipe, with a suitable strainer.

Discharge Head.

The discharge head consists of a circular casting, with suitable flanged discharge nozzle on the side. It rests upon a separate cast-iron base-plate.

Pulley Frame.

Various designs of pulley frames are used, depending on the size of outfit, but the most popular, and the one that is generally adhered to for small and medium horse powers, is the so-called "hood" type of pulley frame, as illustrated on page 720, fitted with ball thrusts and radial ball bearings.

Provision is made to permit the adjustment of the shaft length so that the impellers may be properly spaced within the stages and avoid rubbing.

All bearings in the pulley frame are of very ample size and run immersed in oil, thus completely obviating lubrication difficulties.

Lubrication.

The pump is provided with all necessary oilers for lubricating the running parts. These oilers are located at the surface in full view of the operator.

Motor Bases.

A special design of frame is provided when the pump is to be direct coupled to an electric motor.

Users in India.

Numbers of these pumps have been supplied to Agricultural Departments for Deep Pumping from tube wells for irrigation: to Public Health Departments and Municipal Boards for water supply from deep wells, etc.

Normal Heads and Capacities of Byron Jackson Deepwell Turbine Pumps.

No. 1 Pump. (Outside diameter, 9½ inches.)

otal Head in feet. Imperial gallons per minute.

One Stage.	Two Stage.	Three Stage.	100	150	200	250	300	350	400	450	500
			Revolutions per minute.								
7·5	15	22·5	840	850	887	910	1020	....	....	....	....
10	20	30	940	980	1020	1065	1125	....	....	....	....
12·5	25	37·5		1080	1132	1150	1170	1260	1330	1400	1450
15	30	45		1200	1220	1245	1280	1330	1405	1465	....
17·5	35	52·5		1280	1305	1340	1370	1410	....	....	....
20	40	60		1380	1400	1420	1440	1460	....	....	....

No. 2 Pump. (Outside diameter, 11½ inches.)

One Stage.	Two Stage.	Three Stage.	300	400	500	600	700	800	900	1000	1100	1200
						Revolutions per minute.						
10	20	30	...	830	870	920	970	. .	....	...	...	....
12·5	25	37·5	890	920	950	990	1040	1100	1160	....	....	....
15	30	45	970	995	1020	1060	1110	1180	1260	1330	1410	1480
17·5	35	52·5	1050	1070	1100	1140	1190	1250	1310	1380	1450	. ..
20	40	60	1120	1150	1180	1210	1250	1300	1360	1430	...	....
22·5	45	67·5	1190	1220	1250	1280	1310	1360	1410	1470	....	....
25	50	75	1240	1270	1300	1330	1370	1420	1470	....	....	....
27·5	55	82·5	1310	1330	1350	1380	1420	1460	.	....	....	....
30	60	90	1360	1380	1410	1410	1480	.	...	....	....	....
32·5	65	97 5	1410	1430	1460	. ..		.	....	....	....	....
35	70	105	1460	1490	....	..		....	....	....	....	....

No. 3 Pump. (Outside diameter, 13½ inches.)

One Stage.	Two Stage.	Three Stage.	300	400	500	600	700	800	900	1000	1100
					Revolutions per minute.						
10	20	30	720	760	825	890	970	....	....	....	....
15	30	45	860	900	950	1010	1070	1140	1220	1310	1410
20	40	60	980	1010	1050	1100	1160	1230	1300	1380	1480
25	50	75	1100	1130	1160	1200	1250	1310	1380	1460	....
30	60	90	1200	1230	1260	1290	1330	1390	1450	....	....
35	70	105	1290	1320	1350	1370	1410	1460	....	....	....
40	80	120	1380	1400	1430	1450	..	....	....	....	....
45	90	145	1460	....	....	....	....	...	....	....	....

The figures given in the above tables are based on curves obtained from actual test results.

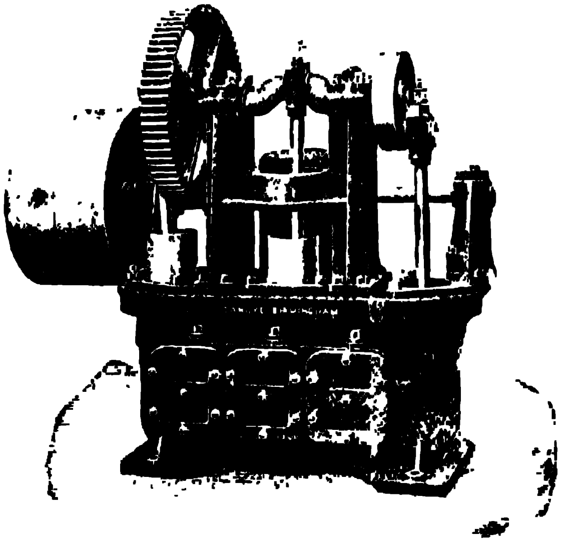
The relation between speed and capacity is not altered by the addition of the extra stages necessary to give the required head. The tables give the total heads for one, two and three stage pumps but any number of additional stages can be supplied to make up the required head.

It is not possible to give a full range of capacities in tabular form, but we shall always be pleased to advise on the size of pump, rising main, and minimum size of tube well for specified duties.

Prices on a tion.

Tangye's Vertical Treble Ram Pump.

200 Feet Series.



6 8 ins. size.

This pump is suitable for working against "heads" up to **200 feet.** It can be driven by belting from an engine or an electric motor, or can be arranged with extended base for carrying a gas or oil engine or an electric motor to be geared direct to the pump, or to drive it through "silent" chain and pitch chain wheels.

The power required to drive these pumps is considerably less than that for other types of equal capacity. Particulars will be given if the total head against which the pump has to work is stated.

The pump is self-contained, having the pump bodies and valve chambers cast together with feet to act as base-plate; the standards and countershaft brackets being bolted to planed faces on the top of the pump chamber, thus rendering the whole arrangement compact.

The fast and loose pulleys are carried on a steel countershaft running in adjustable gun-metal bearings, and drive through machine-cut spur gearing. The crankshaft is of forged steel, running in adjustable bearings, with the centre crank bent to shape to work the inside ram, and carrying on its outer ends the main spur wheel and a turned disc, which have large pins for working the two outside rams.

The connecting rods have adjustable gun-metal bearings at the crank-pin end, the other end being fitted with a solid gun-metal bush.

The rams are of cast iron, working through gun-metal bushed glands and white metal neck bushes in the pump casing.

The suction inlet and delivery outlet are both at the back of the pump body, and an air vessel is fitted to the delivery branch. (When the suction lift is considerable, a vacuum vessel is recommended to be fitted into the suction pipes also, and can be supplied at a small extra charge.)

Visible drop lubricators to the connecting rods, large oil boxes to countershaft and crankshaft bearings, loose flanges for suction and discharge branches, and a set of spanners are included with the pump.

Each pump is run and tested with water before leaving the maker's Works.

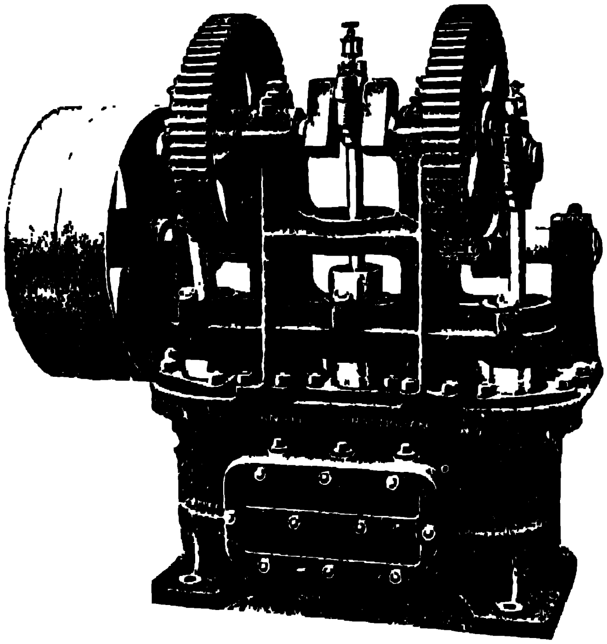
Rams, diameter	**ins.**	**3**	**4**	**5**	**6**
" stroke		**4**	**6**	**8**	**8**
Water per hour, approx.	**Imperial galls.**	**1,000**	**2,500***	**4,500***	**6,500***
Diameter of Suction and Delivery	ins.	2	2½	3½	4
Pulleys, diameter	"	14	16	20	24
" width	"	3	4	5½	6
" revolutions	per min	280	275	235	240
Crankshaft revolutions	" "	56	55	47	48
Height overall, approx.	ins.	37	44	55	57
Width and depth overall, approx.	"	40×27	47×28	54×33	58×37
Approx weight	cwt.	7	11	18	22
Price, as illustrated	**Rs.**	**1,005**	**1,060**	**1,750**	**2,030**

*These quantities of water are calculated at the speeds given above, but in selecting a pump a deduction must be made from the theoretical quantity to allow for loss by leakage, slip, etc.

Tangye's Vertical Treble Ram Pump.

With Bored Guides.

300 Feet Series.



This pump is suitable for working against "heads" up to **300 feet** (equal to 130 lbs. per square inch); and is generally similar in design to the one described on the previous page. It is fitted with bored guides, cast with the standards, and provided with large oil boxes.

The fast and loose pulleys are carried on a steel countershaft running in adjustable brass bearings, and drive through two sets of machine-cut spur gearing. The crankshaft is of forged steel, running in adjustable brass bearings, with the centre crank cut out of the solid and machined all over to work the inside ram, and carrying on its outer ends the main spur wheels, which have large pins for working the two outside rams.

The connecting rods have adjustable brass bearings at the crank-pin end, the other end being fitted with a solid brass bush.

The rams are of cast-iron, working through brass bushed glands and white-metal neck bushes in the pump casing. Gun-metal rams and glands can be supplied at extra cost if preferred.

The suction inlet and delivery outlet are both at the back of the pump body, and an air vessel is fitted to the delivery branch. When the suction lift is considerable, a vacuum vessel is recommended to be fitted into the suction pipes also.

Visible drop lubricators to the connecting rods, large oil boxes to countershaft and crankshaft bearings, loose flanges for suction and discharge branches, and a set of spanners are included with the pump.

The pumps can be ordered fitted with a bye-pass valve as a safety device and for reducing the power required on starting up.

Each pump is run and tested with water before leaving the maker's Works.

Rams, diameter	.. **ins**	**4**	**5**	**6**
„ stroke	. **„**	**6**	**8**	**8**
Water per hour, approx.	**Imperial galls.**	**2,300**	**4,200**	**6,000**
Diameter of suction and delivery	. ins.	2½	3½	4
Pulleys, diameter	.. „	24	30	36
„ width	.. „	4½	5	6
„ revolutions	per min.	190	168	168
Crankshaft revolutions	„ „	48	42	42
Height overall, approx.	.. ins.	47	58	60
Width and depth overall, approx.	.. „	48×30	55×36	58×40
Approx. weight	.. cwts.	15	23	28
Price, as illustrated	.. **Rs.**	**1,770**	**2,315**	**2,675**

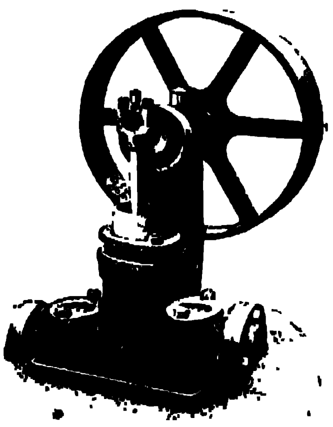
Tangye's Vertical Ram Pump.

This Pump is adapted for purposes where small quantities of water are to be delivered against moderate "heads," such as feeding the water tanks in country houses, hotels, laundries, etc., for pumping the circulating water through the cylinders of Gas and Oil Engines, and other duties of a similar nature

It requires no special foundation, and may be secured to any suitable floor by means of bolts or coach screws

The Pump has a single-acting **gun-metal ram** with suitable packing: the **valves** are of India-rubber with gun-metal guard and muntz metal spindle. The **connecting rod** is of mild steel with brass bearings at each end, those at the large end being adjustable. The **standard** is of cast-iron and forms an **air vessel** on the delivery side of the pump. A **vacuum vessel** (not shown in the illustration) is fitted on the suction inlet **Oil cups** are fitted for lubricating the main shaft and the crank-pin.

Loose screwed flanges are supplied on the suction and delivery branches, and **covers** are provided for affording access to the valves.



4½×4 ins. size.

			Single Pump.		
Ram, diameter	..	ins.	3¼	4¼	5½
„ stroke	..	.. „	3	4	5
Max. total "head"	.	ft	75	80	100
Pulley diameter	.	. ins	16	20½	25
„ width	..	.. „	2½	3½	3½
Diameter Suction inlet		. „	1¼	2	3
Approx. weight	.	.. lbs.	140	246	532
Capacity per hour— (Single ram)					
At 70 revs per minute	.	Imp gals.	360	820	1,700
„ 80 „ „ „	.	.. „	410	935	1,960
„ 90 „ „ „	.	.. „	460	1,050	....
Price, as illustrated		**Rs.**	**225**	**340**	**565**
Price, with two Rams	..	. „	**485**	**835**	**1,395**

Gould's Power Rotary Force Pump.

This type of pump is suitable for pumping oil, water and other liquids to heights up to 60 feet By the addition of a metallic lower valve these pumps will handle hot liquids Bronze pumps of this type should be used for handling acid substances

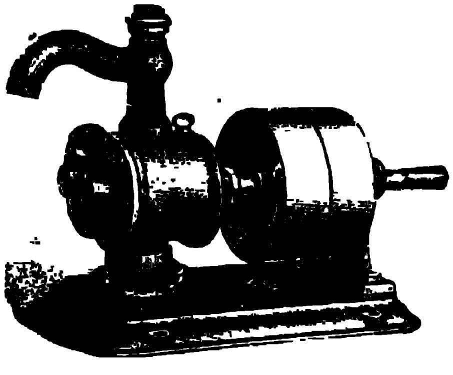
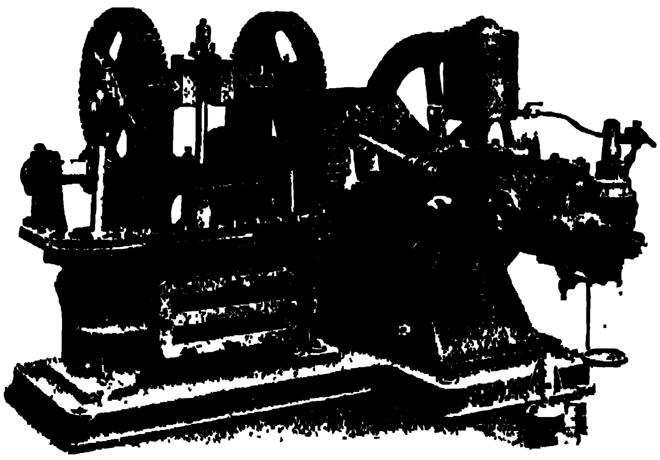


Fig. 1185½.

No.	Capacity per minute. 200 Revolutions.	Suction Pipe.	Delivery Pipes	Lift and Force *	Weight.	Price
	Gallons.	Ins.	Ins.	Ft.	lbs.	Rs.
3	28	1½	1¼	60	84	**110**
4	50	2	1½	60	145	**210**
5	55	2	2	60	154	**225**
6	65	2½	2½	60	320	**375**

* to point of delivery. Pump not more than 20 feet above water.

Tangye's Vertical Treble Ram Pump and Oil Engine.



Vertical Treble Ram Pump, 4 × 6 ins size, 300 ft series, on base-plate with Tangye's Oil Engine.

This arrangement consists of a Vertical Treble Ram Pump, as previously described, combined with a Tangye's AA type Kerosene oil engine the pump countershaft being fitted with a cast-iron machine-cut spur wheel, gearing into a compressed paper pinion, which is secured to a friction clutch carried on the engine shaft.

The pumps up to 200 feet "head" have bent crankshafts, while the pumps for higher "heads" up to 300 feet have slab crankshafts and double gearing.

The engine is as described in detail in a separate section of our catalogue. The friction clutch is provided with suitable lever and bracket for operating the same.

The undernoted table gives a few of the more usual combinations, but others can be quoted for on receipt of full particulars of the duty.

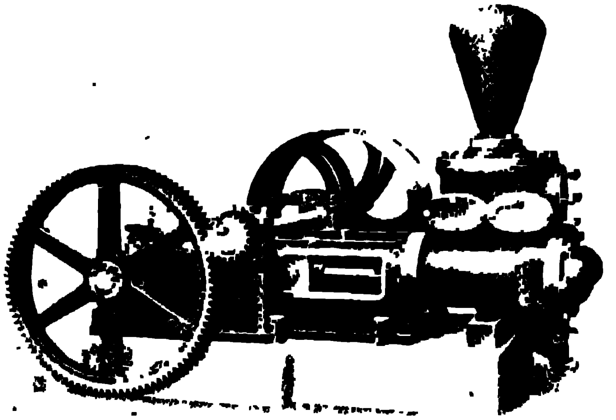
Each pump is run and tested with water before leaving the Works.

Size of Pump.	*Water raised per hour approx.	Pump Shaft Revolutions.	Diameter Suction and Delivery Branches.	Maximum "Head."	Approx. Weight.	**Price, Rs**
Ins.	Imperial Gallons	Per Min.	Ins.	Feet	Cwts.	
3 × 4	1,000	56	2	200	21½	**3,170**
				270	22½	**3,345**
				300	22½	**3,390**
4 × 6	2,300	48	2½	140	27	**3,520**
				200	27	**4,000**
				240	34	**4,575**
				300	34	**4,840**
5 × 8	4,200	42	3½	120	45	**4,840**
				160	49	**5,100**
				200	56	**5,700**
				300	69	**7,040**
6 × 8	6,000	42	4	100	56	**5,720**
				160	63	**6,315**
				200	72	**6,865**
				270	82	**8,185**
				300	92	**8,715**

---

*These quantities of water are calculated at the speeds given above, but in selecting a pump a deduction must be made from the theoretical quantity to allow for loss by leakage, slip, etc

Tangye's Power-Driven Duplex Pumps.



8 10 ins. Geared Pump.

This arrangement is specially suitable for driving by belt, either from a gas or oil engine or line-shaft, and delivers a **regular and constant flow of water,** consisting as it does of **two pump-ends, each double-acting.** It is made in two series, one for "heads" up to **80 feet,** with pulleys keyed direct on the crankshaft; and the other for "heads" up to **200 feet,** driving through gearing.

The pump bodies are cast together, and fitted with cast-iron buckets with leather packings, working in long gun-metal liners which can be readily removed for renewal, the pump rods are of muntz metal, and the valves and seats are of gun-metal with springs of drawn brass.

All the branches are supplied to take flanged pipes; the discharge outlet is so arranged that the valve cover can be removed and the valves examined without breaking any pipe joint, and an air vessel is fitted on the delivery cover; in the pumps up to 5 by 6 ins. size there is a suction inlet on each side of the pump, a cover being provided for the opening not in use.

The connecting rods have adjustable brasses at the crank-pin end, and solid gun-metal bush at the crosshead-pin end. The crosshead heads are of cast iron working in bored guides formed in the bedplate.

The base is of cast-iron, carrying two pedestals with adjustable brass bearings, in which works a steel crankshaft, bent to shape. In the case of the direct-driven pump the fast and loose pulleys are fitted on the crankshaft; but in the geared pump a steel countershaft is supplied working in adjustable brass bearings carried on the bed-plate and fitted with fast and loose pulleys, driving the crankshaft through cast-iron machine-cut gearing. The pumps 7 by 10 ins., and 8 by 10 ins., direct-driven or geared, have an outer bearing and sole-plate to carry the shaft outside the pulleys. A set of spanners is supplied.

Brass buckets can be supplied at an extra charge.

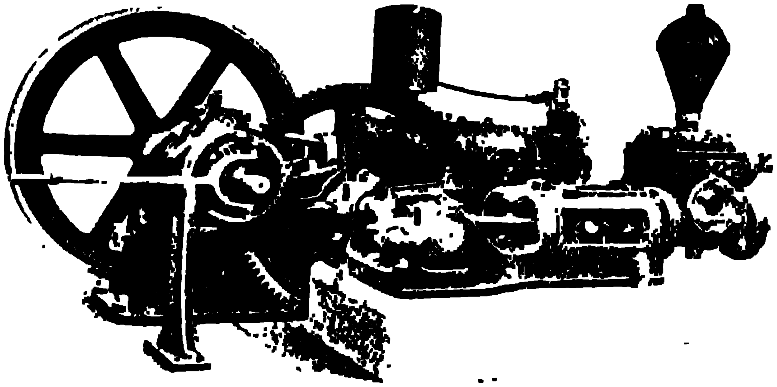
80 ft. Series, Direct-driven.

Size of Pump Inches Diam.	Size of Pump Inches Stroke.	Gallons per Hour	Branches Suction.	Branches Delivery.	Pulleys Pulley.	Pulleys R.P.M.	Price, Rs.
2¾ ×	4	1,000	1½	1½	20×3	50	**705**
3½ ×	5	2,000	2	2	30×3½	50	**840**
4 ×	6	2,800	2½	2½	36×4½	45	**1,100**
4½ ×	6	3,600	3	3	38×5	45	**1,520**
5 ×	6	4,500	3	3	40×5½	45	**1,620**
5 ×	10	7,500	4	3½	45×6½	45	**2,170**
6 ×	10	10,800	5	4	48×7	45	**2,590**
7 ×	10	14,700	6	5	54×8	45	**3,360**
8 ×	10	19,200	7	6	60×9	45	**4,040**

200 ft. Series, Geared.

Size of Pump Inches. Diam.	Size of Pump Inches. Stroke.	Gallons per Hour	Branches Suction.	Branches Delivery.	Pulleys Pulley.	Pulleys R.P.M.	Price, Rs.
2¾ ×	4	1,000	1½	1½	15×3	250	**790**
3½ ×	5	2,000	2	2	18×3½	250	**960**
4 ×	6	2,800	2½	2½	20×4½	225	**1,230**
4½ ×	6	3,600	3	3	22×5	225	**1,640**
5 ×	6	4,500	3	3	24×5½	225	**1,750**
5 ×	10	7,500	4	3½	30×6	225	**2,390**
6 ×	10	10,800	5	4	36×7	225	**2,820**
7 ×	10	14,700	6	5	42×8	225	**3,540**
8 ×	10	19,200	7	6	48×9	225	**4,240**

Tangye's Power-Driven Duplex Pumps.



4 × 6 ins. Pump with Oil Engine.

The Duplex Pump described in the previous page is a very convenient arrangement for coupling up to an Oil Engine, as shown in the above illustration. It can be offered in a variety of combinations, depending upon the quantity of water to be delivered per hour, and the "head" against which it is to be pumped. The table below gives a few of the more usual combinations, but others can be quoted for on receipt of full particulars of the duty.

The engine is supplied with main oil-supply tank, blow-lamp for starting, and the usual accessories. The friction clutch is provided with suitable lever and bracket for operating the same.

When the combined engine and pump are required for erection in countries where engineering assistance is not available, and where troubles may arise from imperfect alignment of shafts, friction clutch, etc., it is recommended that an underlying cast iron base-plate be supplied to carry the whole arrangement, and an extra price will be given to enable this to be ordered when required.

Size. Inches.	Gallons per Hour, Approx.	"Head" against which the water is delivered	Size. Inches	Gallons per Hour, Approx.	"Head" against which the water is delivered.
2¾ × 4	1,000	135 feet.	5 × 10	7,500	175 feet
3½ × 5	2,000	65 "	6 × 10	10,800	120 "
4 × 6	2,800	170 "	7 × 10	14,700	85 "
5 × 6	4,500	100 "	6 × 10	10,800	175 "
4 × 6	2,800	200 "	7 × 10	14,700	130 "
5 × 6	4,500	140 "	8 × 10	19,200	100 "
5 × 10	7,500	85 "	7 × 10	14,700	160 "
5 × 10	7,500	120 "	8 × 10	19,200	120 "
6 × 10	10,800	90 "			

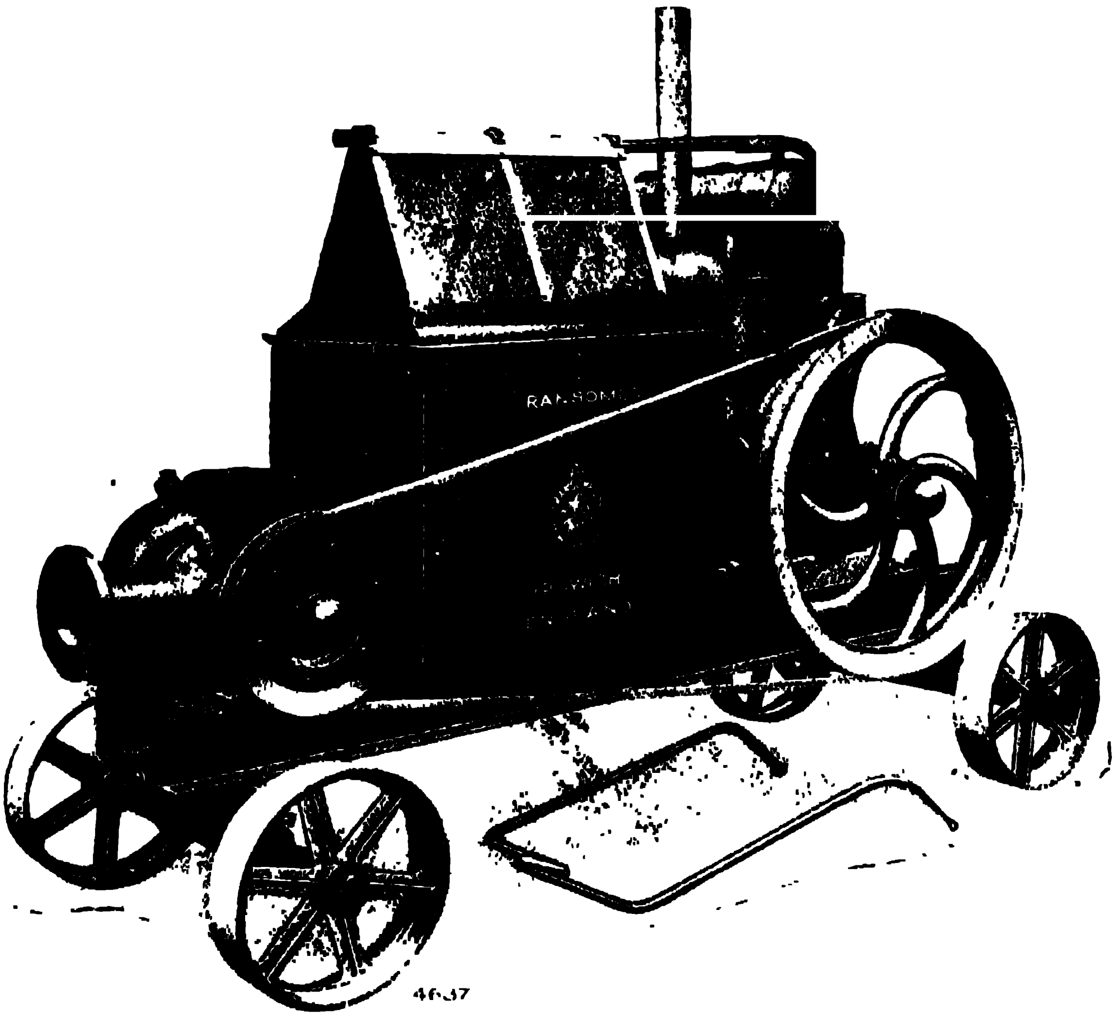
CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ransomes' "Wizard" Portable Pumping Sets.

Gold Medal Award at Calcutta Exhibition, 1923-24.



We illustrate above a special design of Pumping Set suitable for irrigation, general pumping and fire service work.

The power unit consists of a vertical enclosed two-stroke engine by Messrs. Ransomes, Sims and Jefferies, Ltd., of Ipswich, designed to work on low grade kerosene, such as Victoria Brand, etc. A special feature in the design is that the engine starts without the aid of external heating and without any ignition device in the form of a magneto; the heat of compression being alone sufficient to fire the charge. The higher compression required to effect ignition in this way promotes fuel economy which is very low for such small units.

The elimination of the magneto cuts out a frequent source of trouble and removes the temptation for the driver to tamper with a delicate piece of apparatus which is specially liable to get out of order when in unskilled hands.

The engine has the high class finish associated with all Ransomes' products, and in this respect, it compares more than favourably with other makes of small engines. It is exceptionally steady when running and the speed can be varied through a wide range.

Ransomes' "Wizard" Pumping Sets.

The drive is direct from the engine flywheel by means of a simple Vee cycle belt which runs on to a pulley made adjustable as regards its diameter on the pump shaft.

The pump is the well-known Tan-Gyro type fitted with two ring oiled bearings and water sealed glands.

The cooling system is of ample capacity for tropical climates and the water is forced through the engine jacket by a small pump driven from the engine and returns to the top of a simple and efficient cooling arrangement placed over the water tank

The whole is mounted on a simple steel framed trolley of special design with broad flanged wheels and swivelling front wheels which can be locked into position if desired, when working. It is recommended that the pump should always be fitted with a full way valve on the delivery side to control the output which might be so excessive on low lifts as to overload the engine.

Table of Sizes and approximate capacities.

Set	Combination.	Head* Feet.	Capacity Gallons p. m.	Price, Rs.
No. 1.	3½ B.H.P. Engine with Centrifugal Pump 3" Outlet and 4" Suction	20	210	2,500
		30	160	
		40	100	
No. 2.	7 B.H.P. Engine with Centrifugal Pump 4" Outlet and 5" Suction.	15	350	2,900
		20	330	
		30	250	
		40	200	

*Head." By head is meant the total head comprising suction and delivery lift plus friction in pipes.

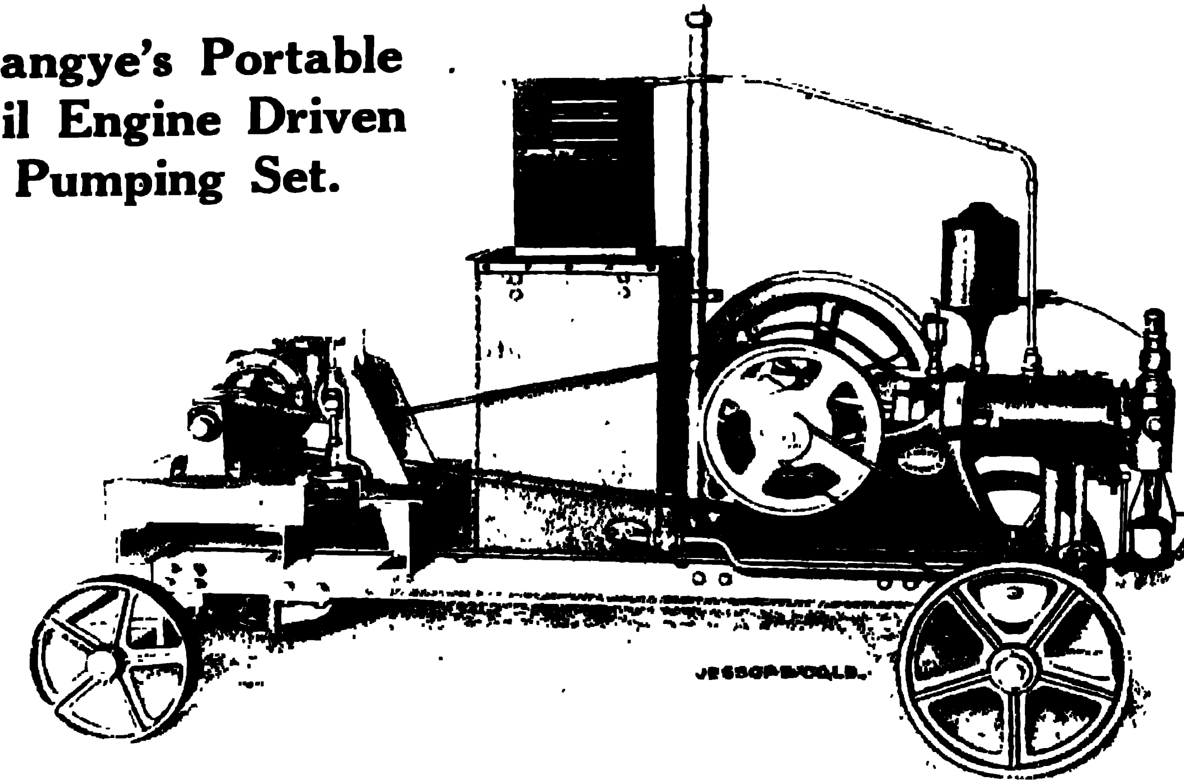
Other Combinations. When higher lifts or pressures are required, as for Fire Service, other pumps can be substituted.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's Portable Oil Engine Driven Pumping Set.


JESSOP & Co. Ld.

We illustrate above a Portable Oil Engine Driven Pumping Set as designed by us for irrigation purposes, drainage works, etc, where a portable set, capable of handling large quantities of water on medium heads, is required.

The arrangement consists of a Tangye's Kerosene Oil Engine driving by belt a "Tan-Gyro" Centrifugal Pump The engine is mounted on a steel carriage with a swivelling front, fitted with chocks and pole for bullock draft.

A separate circulating water pump is provided for the engine and a cooling tower and tank for the water The tension on the belt is adjustable by means of a special tighteaing device. The set illustrated consists of a 3½ B H P engine and a pump with 3 inches diameter delivery.

Table of Capacities at various Heads.

Size of Engine.	Size of Pump.	Head and Gallons per Minute.							
		10 ft.	12 ft.	15 ft.	18 ft.	20 ft.	25 ft.	30 ft.	35 ft.
B.H.P.	Ins.	Gal.	Gal.	Gal	Gal	Gal.	Gal.	Gal.	Gal.
	3	190	185	180	170	162	140	122	90
3½	4	285	270	240	216	195	160	..	..
	5	375	350	300	238	184	..	..	..
	6	433	380	290	180	..	..	..	..
	4	420	405	390	375	360	325	280	230
	5	515	540	460	420	400	330	250	125
5½	6	620	580	520	460	420	280	..	..
	7	740	660	550	420	310	..	..	..
	8	900	800	600	..	..	..	..	..
	4	460	450	440	420	410	380	350	300
	5	600	575	550	520	495	435	370	290
7	6	690	650	610	560	530	420	260	..
	7	830	770	680	570	500	200	..	..
	8	1010	920	770	530	380	..	..	..

Prices on application.

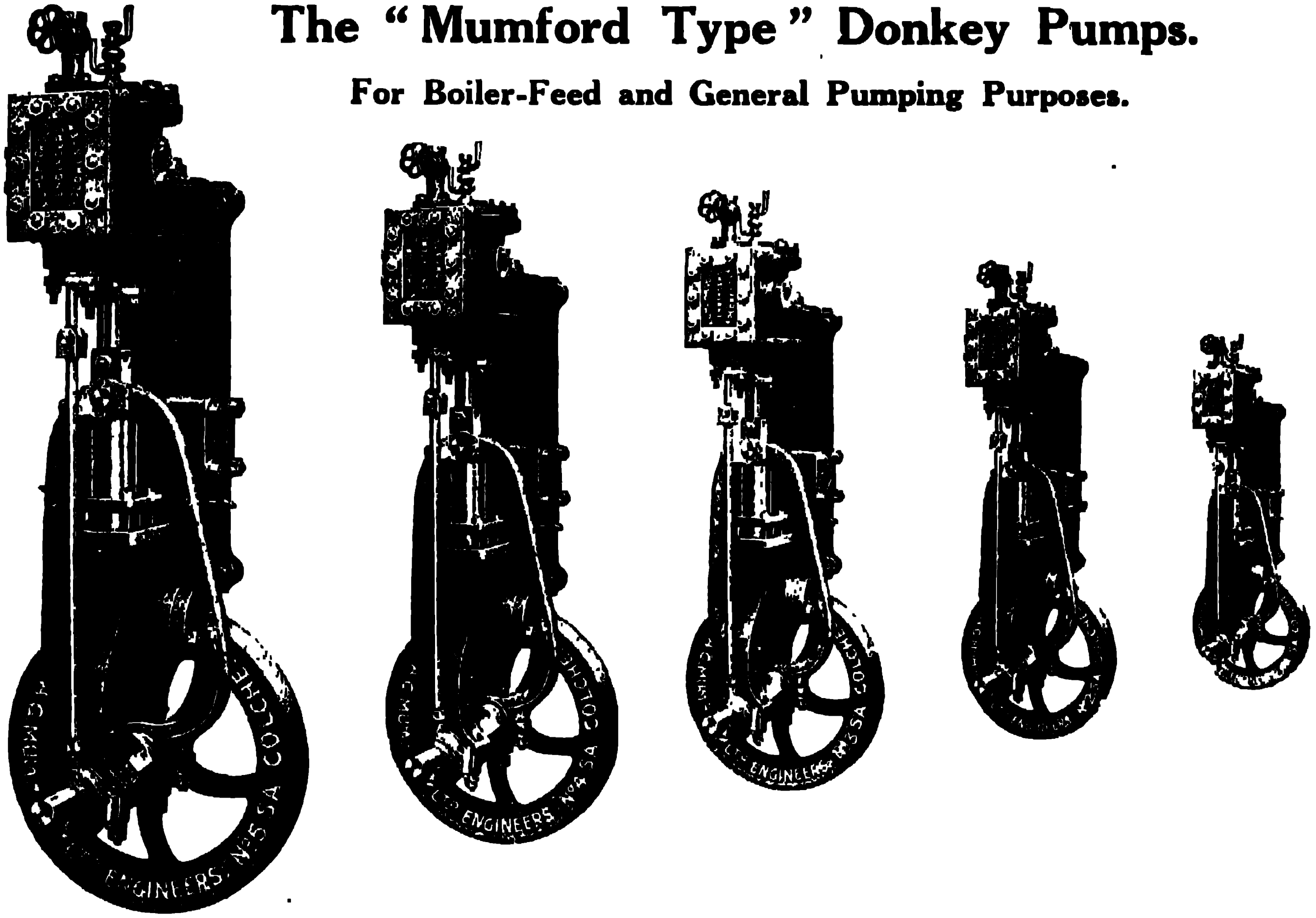
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

The "Mumford Type" Donkey Pumps.

For Boiler-Feed and General Pumping Purposes.

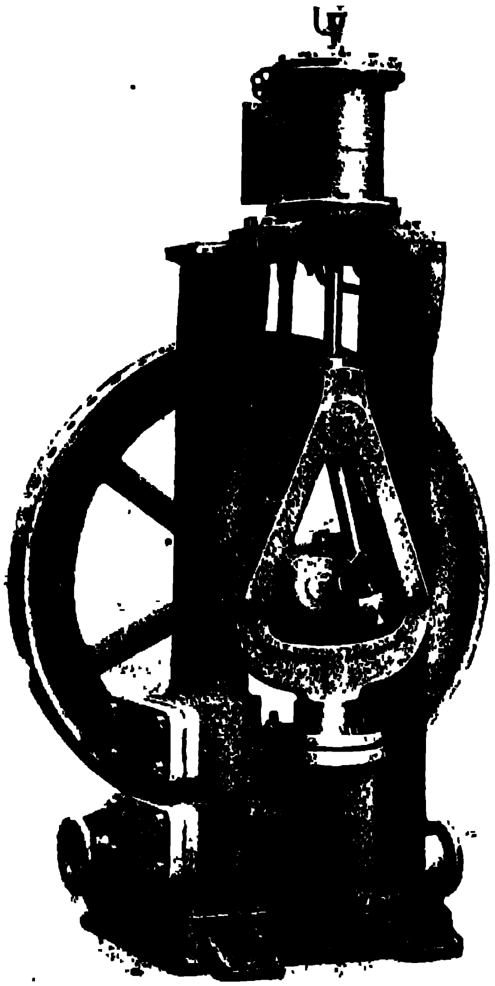


In designing these Pumps special care has been taken to render them adaptable to any position in which they may be required to work, as well as to give immediate and easy access to all working parts. The steam is admitted in the centre of the valve chests and the exhaust is arranged for connection on either side of the cylinder as most convenient. Suction and delivery valves are made interchangeable The material and workmanship throughout are of the best The rams are of gun-metal as are also all glands and bearings, the latter being adjustable. The largest illustration above is that of a double-acting type. With each pump a Starting Valve. Grease Cup, Pet Cock and Loose Flanges are supplied.

Particulars and Prices.

Types and Sizes.		Single Action.					Double Action.
		No. 1	No. 2.	No 3.	No 4.	No 5.	No 6.
Diameter of ram	ins.	1 3/16	1 9/16	2 1/8	2 5/8	3 1/8	3 1/4
„ .. cylinder	„	2 1/2	3	3 3/4	4 1/2	5¼	5¼
Length of stroke	„	2 1/2	3	4	5	6	6
Gallons per hour .	..	130	210	440	660	1,000	1,820
N. H. P. of boiler for which pump is suitable	..	8	16	30	45	70	72
Diameter of steam pipe	ins.	3/8	3/8	1/2	¾	¾	¾
„ „ exhaust pipe	„	1/2	1/2	¾	1	1	1
.. „ suction and discharge pipes ..	cwts	¾	1	1¼	1½	2	2
Weight	„	1	2	3¼	4	7	....
Price, ...	**Rs.**	**305**	**365**	**460**	**590**	**760**	**900**

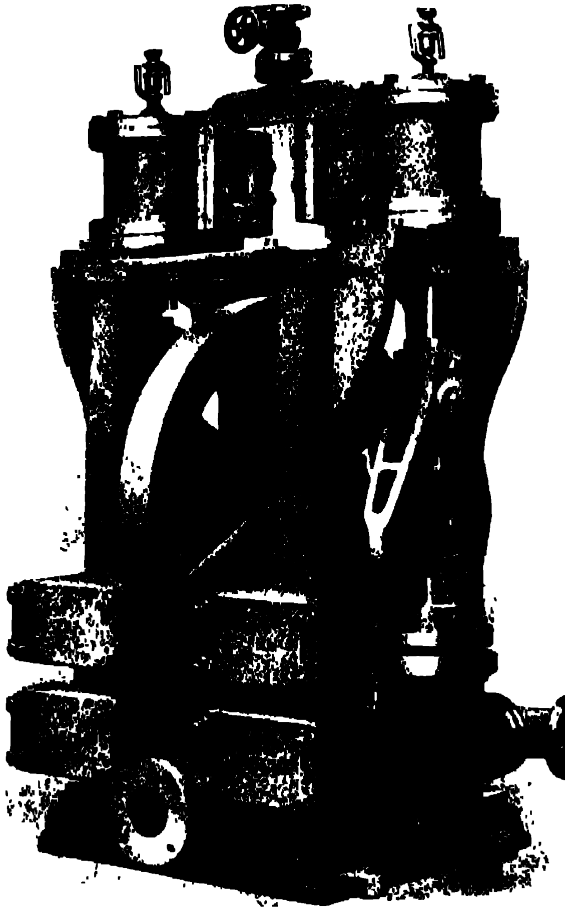
Cameron Type Single Ram Boiler-Feed Pump.



These Single Ram Pumps are specially made for Boiler Feeding. They are strong, simple in construction, very reliable, and all parts are easy of access. The suction passages and air vessel are formed in the bed-plate, the columns forming the delivery air vessels. They are fitted with large mushroom valves made of gun-metal, except when ordered to be otherwise to meet the special requirements of customers. After being carefully gauged all over for thickness, the hollow castings are proved to 300 lbs. per square inch; the Pumps are finally tested at actual work, drawing water from a well 25 feet deep and forcing against 100 lbs. per square inch. Pumps for higher working pressures can also be supplied.

Particulars and Prices of Standard Sizes.

Diameter of Steam Cylinder	Diameter of Rams	Length of Stroke	Contents in Gallons per Hour	Revolutions pe Minute	DIAMETER OF PIPES.				Diameter of Flywheel.		Outside Barre to end of Shaf		Total Height		Approximat Weight in Cwts.	Price. Pump 100 lbs. Pressure.
					Suction.	Delivery.	Steam.	Exhaust.								
Ins.	Ins.	Ins.			Ins.	Ins.	Ins.	Ins.	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.		Rs.
5	3	5	670	90	2	1½	½	1	2	2	1	10	4	10	7½	980
5	3½	5	900	90	2½	2	½	1	2	6	2	1	4	10	9½	1,100
6	4	6	1,280	80	2½	2	½	1	3	0	2	2	5	7	12½	1,270
7	4½	6	1,600	80	3	2½	¾	1¼	3	0	2	5	5	10	16	1,450
7	5	6	2,000	80	3	2½	¾	1¼	3	0	2	5	5	10½	17½	1,570
7	5	7	2,170	75	3	2½	¾	1¼	3	3	2	6	6	3	18½	1,630
8½	6	8	3,200	70	3½	3	1	1½	3	6	2	11	7	2	26	2,080



Cameron Type Double Ram Boiler-Feed Pump.

160 lbs. Water Pressure.

These Double Ram Pumps are specially made for feeding high pressure Boilers. They are strong, simple in construction, very reliable, and all parts are easy of access.

Pumps with Rams cased and glands bushed with gun-metal are for Marine Boilers or where water is impure.

The suction passages and air vessels of both types are formed in the bed-plate, the columns forming the delivery air vessels. They are fitted with large mushroom valves, made of gun-metal, except when ordered to be otherwise to meet the special requirements of customers. After being gauged all over for thickness, the hollow castings are proved to 500 lbs. per square inch; the pumps are finally tested at actual work, drawing water from a well 25 feet deep, and forcing against 160 lbs. per square inch.

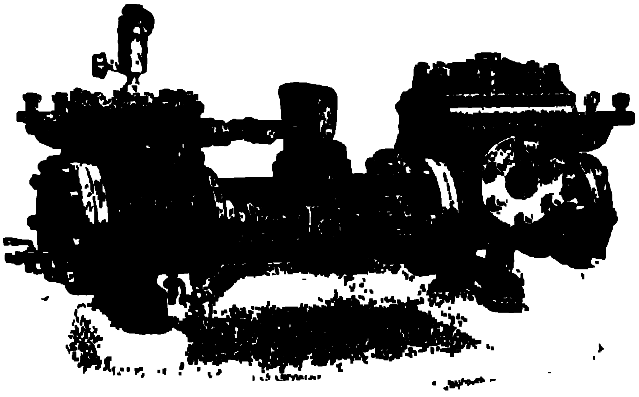
Particulars and Prices of Standard Sizes.

Diameter of Steam Cylinders.	Diameter of Rams.	Length of Stroke.	Revolutions per Minute.	Contents in Gallons per Hour.	Diameter of Steam Pipes.	Diameter of Exhaust Pipes.	Diameter of Suction Pipes.	Diameter of Delivery Pipes.	Total Height.		Width over Stuffing-boxes.		Width over Pipes.		Approximate Weight in Cwts.	Price, Ordinary Rams and Glands.	Price, Ram Cased and Glands bushed with Gun-metal.
Ins.	Ins.	Ins.			Ins.	Ins.	Ins.	Ins.	Ft.	Ins.	Ft.	Ins.	Ft.	Ins.		Rs.	Rs.
5	3	5	90	1,340	¾	1	2½	2	5	0	2	8	2	6	13¼	2,140	2,370
5	3½	5	90	1,800	¾	1	3	2½	5	1	2	10	2	11½	17½	2,400	2,680
6	4	6	80	2,560	¾	1	3	2½	6	0	3	0½	3	3	21½	2,630	2,940
7	4½	6	80	3,200	1	1¼	4	3	6	1	3	7	3	5½	26½	2,940	3,350
7	5	6	80	4,000	1	1¼	4	3	6	4½	3	6	3	7	28½	3,160	3,530
7	5	7	75	4,340	1	1¼	4	3	6	8	3	7	3	7	31	3,310	3,720
8½	6	6	80	5,760	1¼	1½	4½	3½	6	10	3	11	4	0	42	3,900	4,350
8½	6	8	70	6,400	1¼	1½	4½	3½	7	6	4	0	4	1	44	4,210	4,700
8½	6	10	60	7,000	1¼	1½	4½	3½	8	5	4	0	4	6	56½	5,330	5,880

CALCUTTA, JAMSHEDPUR
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.



Tangye's Duplex Boiler Feeder. Type "A."

This Pump is designed for working with and against steam pressures up to **220 lbs. per square inch.** At a small extra charge, it can, however, be strengthened for higher pressures.

The piston rods are of muntz metal, fitted with cast-iron pistons and rings.

The Pumps are fitted with cast-iron adjustable buckets packed with compressed canvas working in long gun-metal liners, which can be readily removed for renewal. The valves and seats are of gun-metal with springs of drawn brass.

There is a suction inlet and exhaust branch on each side of the Pump, covers being provided for the openings not in use. The discharge outlet is so arranged that the valve cover can be removed without breaking any pipe joint. Plugs for draining the water cylinders are also provided. All the branches are arranged to take flanged pipes.

One gun-metal lubricator, four drain cocks, and a set of spanners are supplied with the Pump.

Each Pump is tested with steam and water before leaving the Works.

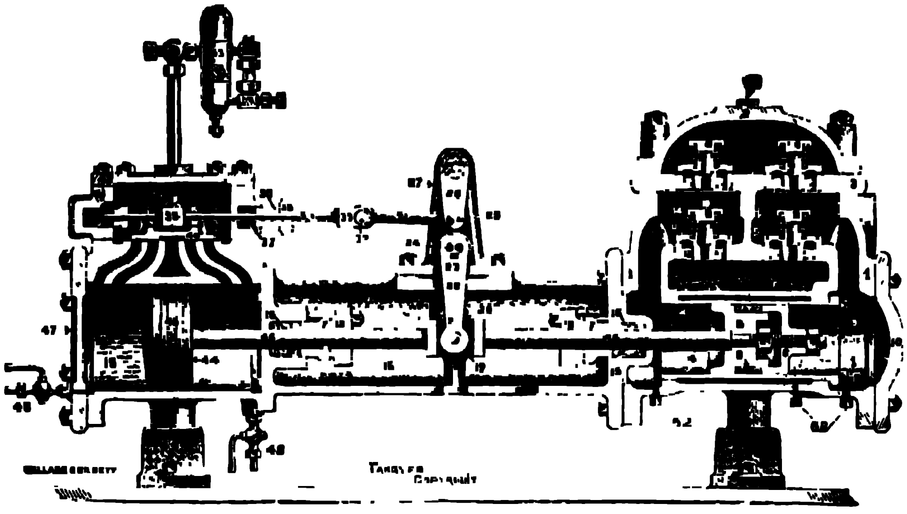
Diameter of steam cylinders	**ins.**	3	3	3	3¼	4	4½	4½
" " pumps	"	1½	1¾	2	2	2½	2¾	3
Length of stroke	"	3	3	3	4	4	4	5
Water per hour, approx	**Imperial galls**	270	370	480	650	1,000	1,230	1,830
Bucket speed ..	ft. per min	30	30	30	40	40	40	50
Water per hour (for Boiler Feeding)	**Imperial galls.**	90	120	160	240	380	460	730
Bucket speed	ft per min.	10	10	10	15	15	15	20
Diameter of suction inlets	ins.	1¼	1¼	1¼	1¼	1½	1½	2
" , delivery outlet	"	1¼	1¼	1¼	1¼	1½	1½	2
" .. steam inlet	"	⅜	⅜	⅜	⅜	½	½	¾
" " exhaust outlets	"	½	½	½	½	¾	¾	1
Approx weight	cwts	2½	2½	2½	2½	3½	3¾	4½
Price, ..	**Rs.**	445	445	455	465	540	580	610

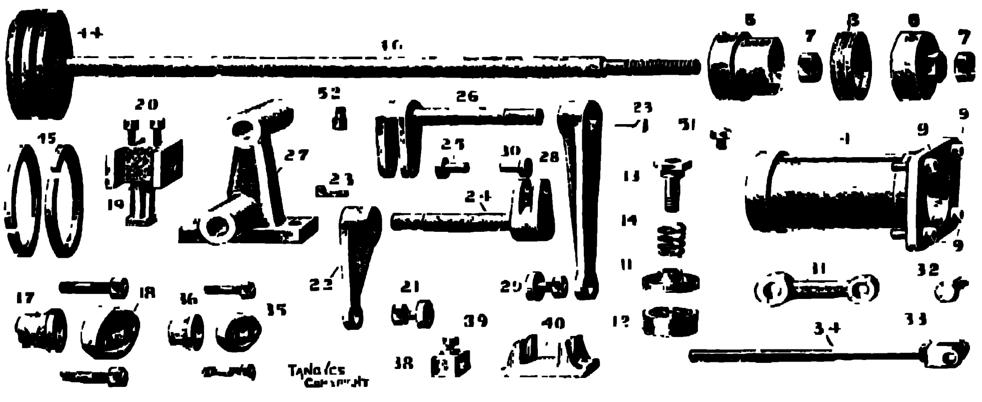
Diameter of steam cylinders	**ins**	5½	6	6	6	7½	7½
" " pumps	"	3½	4	4½	5	4½	5
Length of stroke	"	5	6	6	6	6	6
Water per hour, approx.	**Imperial galls.**	2,450	3,900	4,950	6,100	4,950	6,100
Bucket speed	ft. per min.	50	60	60	60	60	60
Water per hour (for Boiler Feeding)	**Imperial galls.**	990	1,620	2,050	2,540	2,050	2,540
Bucket speed	ft per min.	20	25	25	25	25	25
Diameter of suction inlets	ins.	2	2½	3	3	3	3
" " delivery outlet	"	2	2½	3	3	3	3
" " steam inlet	"	¾	1	1	1	1½	1½
" " exhaust outlets	"	1	1¼	1½	1¼	2	2
Approx. weight	cwts.	5¼	6½	8	8	9½	9½
Price, ...	**Rs.**	660	770	855	855	1,040	1,040

Particulars of larger sizes on application.

Tangye's Duplex Boiler Feeder. Type "A."

Parts for Renewals and Repairs.





1 Pump body.
2 Pump top cover.
3 Delivery valve plate.
4 Pump liner.
5 Bucket.
6 Bucket end.
7 Bucket nuts.
8 Canvas-packing rings.
9 Liner studs.
10 Pump end cover.
11 Pump valve.
12 Pump valve seat.
13 Pump valve spindle.
14 Pump valve spring.
15 Steam cylinder and distance piece.
16 Piston rod gland packing.
17 Piston rod gland.
18 Piston rod gland follower and studs.
19 Crosshead
20 Crosshead pins.
21 Roller and nut.
22 Short rocking lever.
23 Keys for rocking levers.
24 Short cam and rocking shaft.
25 Pin for cam and coupling link.
26 Long cam and rocking shaft
27 Valve gear bracket.
28 Long rocking lever.
29 Roller and nut.
30 Pin for cam and coupling link.
31 Coupling link.
32 Pin for coupling link and slide valve rod end.
33 Slide valve rod end.
34 Slide valve rod.
35 Slide valve rod gland follower and stud.
36 Slide valve rod gland.
37 Slide valve rod gland packing.
38 Slide valve block.
39 Slide valve block pin.
40 Slide valve.
41 Steam chest.
42 Steam chest cover.
43 Lubricator.
44 Piston.
45 Piston rings.
46 Piston rod.
47 Steam cylinder cover.
48 Drain cocks.
49 Cylinder and pump feed.
50 Suction inlet.
51 Charging plug.
52 Pump drain plugs.

We carry a large stock of spare parts for Tangye's Pumps and when unobtainable from stock we can generally make up parts in our works from samples taken from stock pumps.

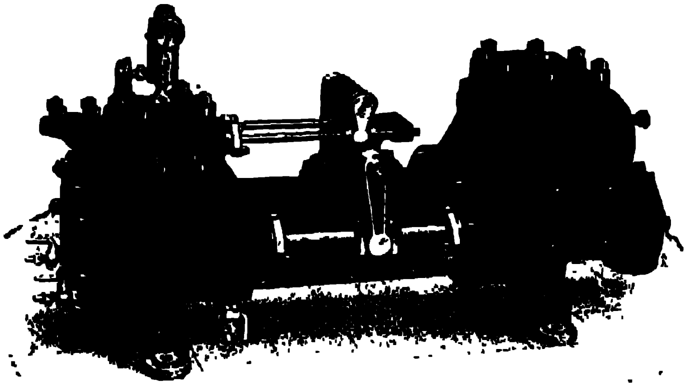
NOTE WHEN ORDERING:—We cannot execute orders without knowing whether the Pump for which parts are required is Type "A" or "B." An [illegible] leakage, slip, etc. [illegible]
a constituent to identify the type. The Type "A e is calculated on 50 lbs per square inch at the [illegible]
are not in the Type "B." The Type "B" val[illegible] data is given merely as a general guide in the
are supported in guides which form part of the figures may be somewhat more, while with lower
When ordering [illegible] no case should a pump be put down to work with less than

CALCUTTA, JAMSHEDPUR, DELHI LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Tangye's Duplex Boiler Feeder. Type "B."



This Pump is designed for working with and against steam pressure up to **180 lbs. per square inch.**

The piston rods are of muntz metal, fitted with cast-iron pistons and rings; the stuffing-box glands are of gun-metal.

The Pumps are fitted with cast-iron buckets packed with compressed canvas, working in gun-metal liners. The valves and seats are of gun-metal, with springs of drawn brass.

There is a suction inlet and exhaust branch on each side of the Pump, covers being provided for the openings not in use. Plugs are fitted for draining the water cylinders.

All the branches are arranged to take flanged pipes, and can be made to suit British Standard Templates if required.

One gun-metal lubricator, four cylinder drain cocks, and a set of spanners are supplied with the Pump.

Each Pump is tested with steam and water before leaving the Works.

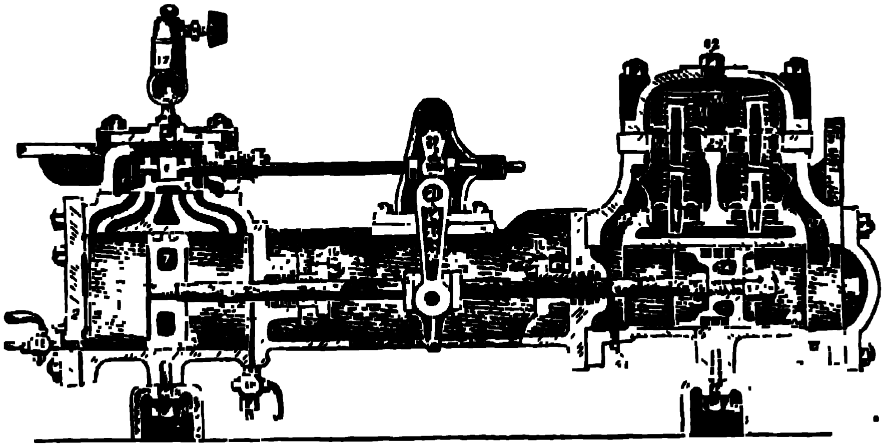
Diameter of steam cylinders	**ins.**	**3**	**4**	**4½**	**4¾**	**5¼**	**6**
" " pumps	**"**	**2**	**2½**	**2¾**	**3**	**3½**	**4**
Length of stroke	**"**	**3**	**4**	**4**	**5**	**5**	**6**
Water per hour, approx.	**Imperial galls.**	**480**	**1.000**	**1 230**	**1,830**	**2,450**	**3,900**
Bucket speed	ft. per min.	30	40	40	50	50	60
Water per hour (for Boiler Feeding)	**Imp. galls.**	**160**	**380**	**640**	**730**	**990**	**1,620**
Bucket speed	ft. per min.	10	15	15	20	20	25
Diameter of suction inlets	ins.	1¼	1½	1½	2	2	2½
" " delivery outlets	"	1¼	1½	1½	2	2	2½
" " steam inlet	"	⅜	½	½	¾	¾	1
" " exhaust outlets	"	½	¾	¾	1	1	1¼
Length and width, approx.	"	30×13	33×14	35×14	39×16	40×16	43×17
Height overall	"	16	18	19	20	21	24
Approx. weight	cwts.	2	2¾	3	3½	4	5¼
Price	**Rs.**	**365**	**430**	**465**	**510**	**530**	**615**

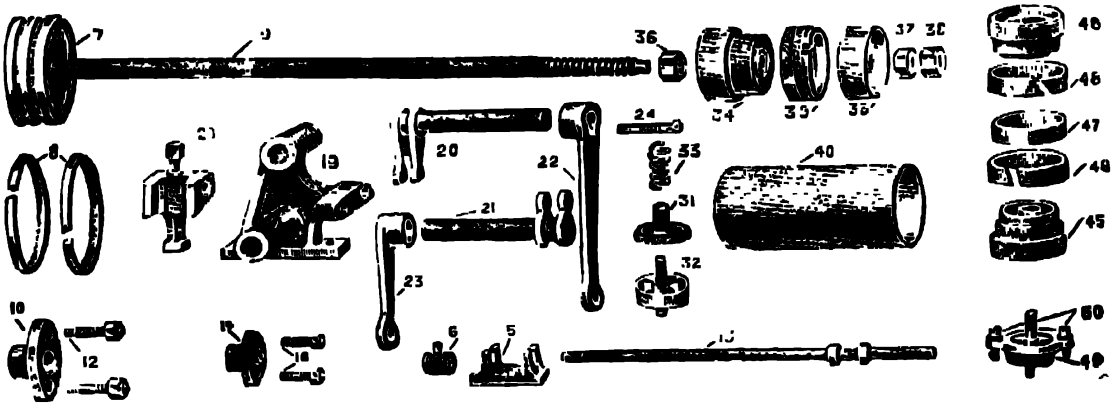
The quantities of water stated are equal to the calculated displacement of the Pump buckets. In selecting a Pump a deducti- [illegible] made from the theoretical quantity to allow for loss by leakage, slip, [illegible] weight .. cwts.
Price, .. Rs.
the U.S.A. gallon.

Particulars of larger sizes [illegible] for boiler feeding when the steam pressure

Tangye's Duplex Boiler Feeder. Type "B."

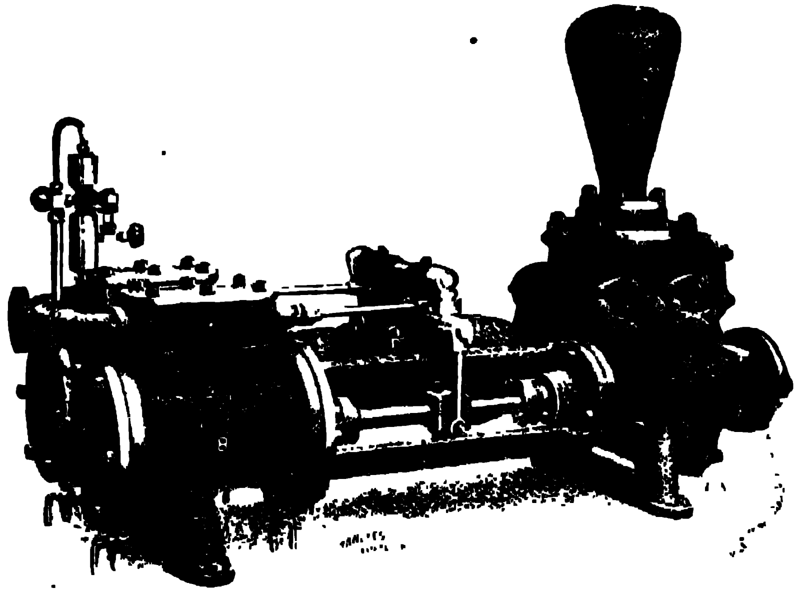
Parts for Renewals and Repairs.





1 Steam cylinders and distance piece.
2 End cover for steam cylinder.
3 Steam chest.
4 Cover for steam chest.
5 Slide valve.
6 „ „ block.
7 Piston.
8 „ rings.
9 „ rod.
10 „ „ glands.
11 „ „ gland packing.
12 „ „ „ studs.
*13 Valve spindle.
14 „ „ gland.
15 „ „ „ packing.
16 „ „ „ studs.
17 Lubricator.
18 Cylinder drain cocks.
19 Valve gear bracket.
20 Rocking shaft with long cam.
21 „ „ „ short cam.
22 Long rocking lever.
23 Short „ lever.
24 Keys for rocking levers.
25 Crosshead.
26 „ set pin.
27 Pump body.
28 Cover for pump end
29 Valve plate.
30 „ box cover
31 Valve.
32 „ seat.
33 „ springs.
34 Bucket body.
35 Bucket cap.
36 Front nut for bucket
37 Back „ „ „
38 Lock „ „ „
39 Canvas packing for bucket.
40 Pump liner.
41 „ drain plugs.
42 Charging plug.
43 Foot for steam cylinders or pump body.
44 Bolts for foot.
45 Brass bucket (forward end).
46 „ „ (back end).
47 „ „ (centre ring).
48 Split rings for brass bucket.
49 Valve seat (secured type).
50 Securing pins for valve seat.

...s by leakage, slip, etc.
When enquiring for or ordering parts, quote the e is calculated on 50 lbs. per square inch at the also state the
size and number of th This data is given merely as a general guide in the
the figures may be somewhat more. while with lower
in no case should a pump be put down to work with less than
See note on page 737 rega...



6×4×10 ins. size.

Tangye's Duplex Steam Pumps.

Standard Type.

300 feet Series.—100 lbs. Steam Pressure.

In this type the pump end is suitable for working against "heads" up to 300 feet but the "head" against which a pump will work depends upon the relative proportions of the steam and water cylinders and the steam pressure available In any case the combination should not be such as to put more than 300 feet "head" on the pump, nor should the steam pressure exceed 100 lbs. per square inch, this being the maximum pressure for which the steam cylinders are designed.

The pump is fitted with cast-iron pistons and rings, cast-iron buckets with leather packings working in long gun-metal liners (readily removed for renewal), steel piston rods, and gun-metal valves and seats All the branches are arranged to take flanged pipes.

The air vessel is fitted on the valve-box cover, and this can be removed without breaking any pipe joints, so that the delivery valves may be readily examined. Separate side doors give access to the suction valves Plugs for draining the water cylinders are also provided.

One gun-metal sight-feed lubricator, four drain cocks, and a set of spanners are supplied with the pump.

Each Pump is tested with steam and water before leaving the Works.

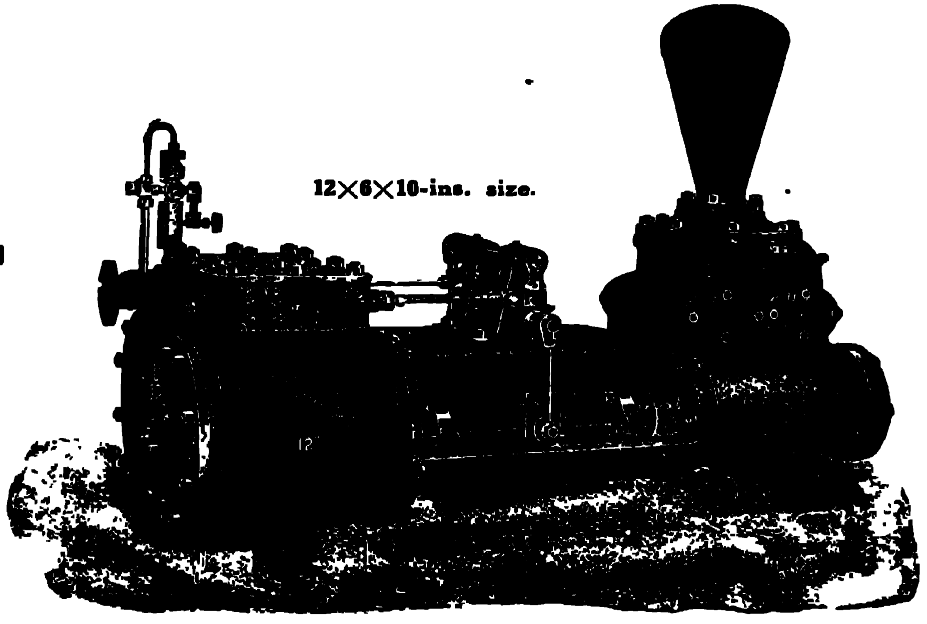
Particulars and Prices of Standard Sizes.

Diameter of Steam-Cylinders .. ins.	6	6	6	8	8	8	8	8
„ „ Pumps .. „	4	5	6	4	5	6	7	8
Length of stroke .. „	10	10	10	10	10	10	10	10
Water per hour, approx. Imperial galls.	4,890	7,650	11,000	4,890	7,650	11,000	14,900	19,500
"Head" in feet per lb steam pressure	3·2	2·0	1·3	6·0	3·7	2·5	1·8	1·4
Diameter of suction inlet .. ins.	3½	4	5	3½	4	5	6	7
„ delivery outlet .. „	3	3½	4	3	3½	4	5	6
„ steam inlet	[illegible]	1	1	1½	1½	1½	1½	1½
„ exh	[illegible]	[illegible]	1½	2	2	2	2	2
[illegible] .. cwt.	[illegible]	[illegible]	16	13½	15¾	18	20½	22½
Price, .. Rs.	[illegible]	[illegible]	[illegible]	1,490	1,610	1,830	2,030	2,225

Particulars of larger sizes on [illegible].

Tangye's Duplex Steam Pumps.

Standard Type



Particulars and Prices of Standard Sizes.

Diameter of steam cylinders .. ins.		10	10	10	10	10	12	12	12
„ „ pumps .. .. „		5	6	7	8	10	6	7	8
Length of stroke .. .. „		10	10	10	10	10	10	10	10
Water per hour, approx. .. Imperial galls.		7,650	11,000	14,900	19,500	30,500	11,000	14,900	19,500
* "Head" in feet per lb. steam pressure		6·1	4·2	3·0	2·3	1·4	6·1	4·4	3·3
Diameter of suction inlet .. .. ins.		4	5	6	7	8	5	6	7
„ „ delivery outlet .. „		3½	4	5	6	7	4	5	6
„ „ steam inlet .. .. „		2	2	2	2	2	2	2	2
„ „ exhaust outlet .. .. „		2½	2½	2½	2½	2½	2½	2½	2½
Approx. weight .. .. cwts.		19	21½	24	27	35	25½	28½	30½
Price .. .. Rs.		1,890	2,110	2,350	2,585	3,070	2,190	2,410	2,665
Diameter of steam cylinders .. ins.		12	12	14	14	14	14	14	16
„ „ pumps .. .. „		10	12	7	8	10	12	14	8
Length of stroke .. .. „		10	10	10	10	10	10	10	10
Water per hour, approx. .. Imperial galls.		30,500	44,000	14,900	19,500	30,500	44,000	59,900	19,500
* "Head" in feet per lb. steam pressure		2·1	1·4	6·1	4·6	2·9	2·0	1·4	6·2
Diameter of suction inlet .. .. ins.		8	9	6	7	8	9	10	7
„ „ delivery outlet .. „		7	8	5	6	7	8	9	6
„ „ steam inlet .. .. „		2	2	2½	2½	2½	2½	2½	2½
„ „ exhaust outlet .. .. „		2½	2½	3	3	3	3	3	3
Approx. weight .. . cwts.		39	46½	31½	34	43	52	65½	41
Price .. .. Rs.		3,200	4,600	2,710	2,945	3,500	4,460	5,595	3,340
Diameter of steam cylinder .. ins.	16	16	16	18	18	18	20	20	20
„ „ pumps .. „	10	12	14	10	12	14	10	12	14
Length of stroke .. .. „	10	10	10	10	10	10	10	10	10
Water per hour, approx. Imperial galls.	30,500	44,000	59,900	30,500	44,000	59,900	30,500	44,000	59,900
* "Head" in feet per lb. steam pressure	3·8	2·6	1·9	5·0	3·4	2·5	6·2	4·3	3·1
Diameter of suction inlet .. ins.	8	9	10	8	9	10	8	9	10
„ „ delivery outlet .. „	7	8	9	7	8	9	7	8	9
„ „ steam inlet .. „	2½	2½	2½	3	3	3	4	4	4
„ „ exhaust outlet .. „	3	3	3	3½	3½	3½	5	5	5
Approx. weight .. .. cwts.	49	57	70½	51½	63	76½	62	70½	84
Price, ... Rs.	4,315	4,870	5,985	4,760	5,750	6,790	5,750	6,900	7,595

The quantities stated are for clear cold water, and are equal to the calculated displacement of the pump buckets when running at a speed of 75 feet per minute. In selecting a pump, a deduction must be made from the theoretical quantity to allow for loss by leakage, slip, etc.

* The "Head" in feet per lb. of steam pressure is calculated on 50 lbs per square inch at the cylinder, which is a usual working pressure. This data is given merely as a general guide in the selection of a pump, as with high pressures the figures may be somewhat more, while with lower pressures they will probably be less. In no case should a pump be put down to work with less than 20 lbs. per square inch.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

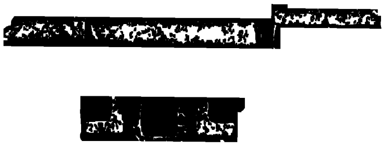
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

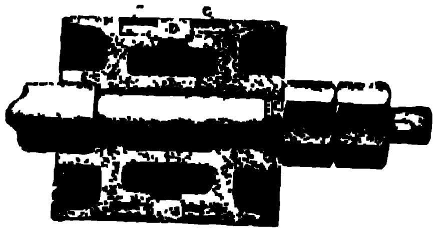
Tangye's Duplex Steam Pumps.

"Standard Type."

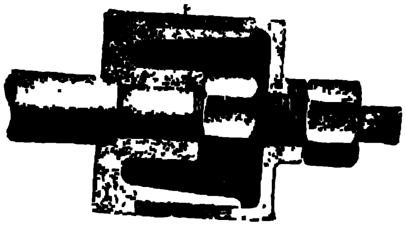
Pump Valves and Buckets.



Leather-packed Bucket.



Ring-packed Bucket.

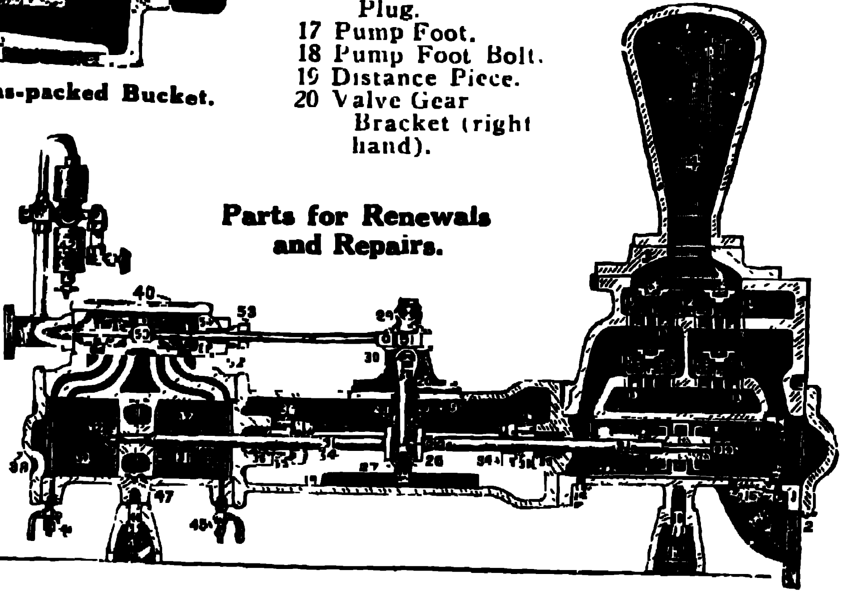


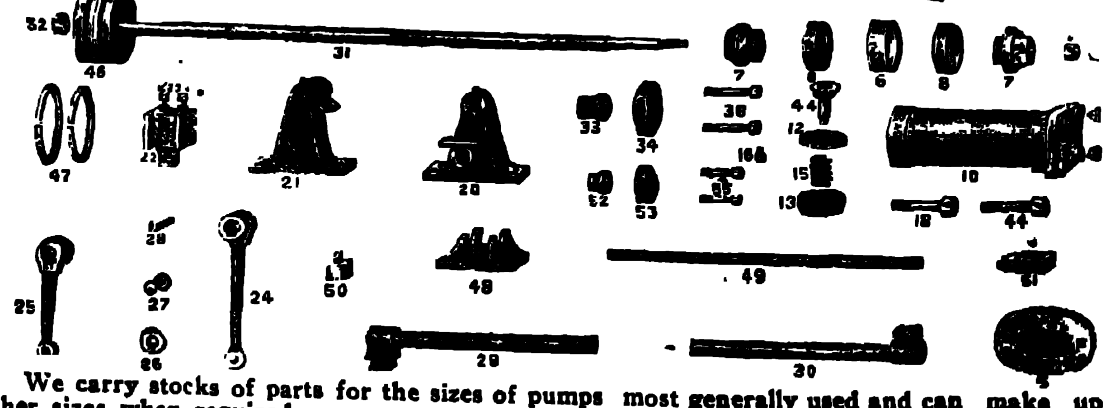
Canvas-packed Bucket.

Buckets may be of brass or iron, and in place of the usual cup leathers can be fitted with brass, vulcanite or iron rings. Canvas or hemp-packed buckets may also be supplied, or buckets fitted with dermatine cups instead of leathers.

1 Pump Body.
2 Pump End Cover.
3 Pump Top Cover.
4 Air Vessel.
5 Pump Valve Door.
6 Bucket Middle.
7 Bucket Ends.
8 Bucket Leathers.
9 Bucket Nuts.
10 Pump Liner.
11 Pump Liner Studs.
12 Pump Valves.
13 Pump Valve Seats.
14 Pump Valve Spindles.
15 Pump Valve Spring.
16 Pump Drain Plug.
17 Pump Foot.
18 Pump Foot Bolt.
19 Distance Piece.
20 Valve Gear Bracket (right hand).
21 Valve Gear Bracket (left hand).
22 Crosshead.
23 Crosshead Pins.
24 Long Rocking Lever.
25 Short Rocking Lever.
26 Rocking Lever Roller.
27 Rocking Lever Bolt and Nut.
28 Key for Rocking Levers.
29 Rocking Shaft with long Cam.
30 Rocking Shaft with short Cam.
31 Piston Rod.
32 Piston Rod Nut.
33 Piston Rod Gland.
34 Piston Rod Gland Follower.
35 Piston Rod Gland Packing.
36 Piston Rod Stuffing Box Studs.
37 Steam Cylinder.
38 Steam Cylinder and Cover.
39 Steam Chest.
40 Steam Chest Cover.
41 Steam Breeches Pipes.
42 Sight Feed Lubricator.
43 Steam Cylinder Foot.
44 Steam Cylinder Foot Bolt.
45 Steam Cylinder Drain Cocks.
46 Piston.
47 Piston Rings.
48 Slide Valve.
49 Slide Valve Rod.
50 Slide Valve Rod Button and Set Pin.
51 Slide Valve Rod End and Set Pin.
52 Slide Valve Rod Gland.
53 Slide Valve Rod Gland Follower.
54 Slide Valve Rod Gland Packing.
55 Slide Valve Rod Stuffing Box Studs.

Parts for Renewals and Repairs.





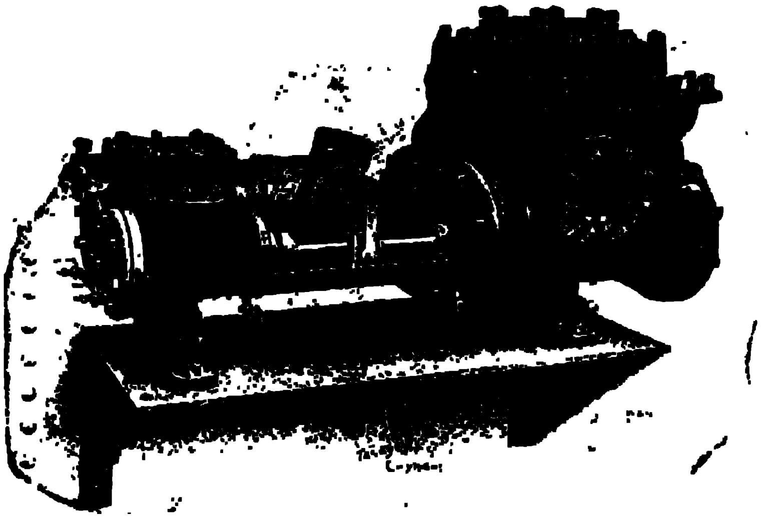
We carry stocks of parts for the sizes of pumps most generally used and can make up parts for other sizes when required.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd

ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.



Tangye's Duplex Ballast Pump.

This Pump is made suitable for working with steam pressures up to **160 lbs. per square inch** and against "heads" up to **120 feet.**

The piston rods are of muntz metal, fitted with cast-iron pistons and rings.

The Pumps are cast together, and fitted with gun-metal buckets with gun-metal rings working in long gun-metal liners which can be readily removed for renewal.

The valves are of India-rubber, working on gun-metal seats, with springs of drawn brass.

There is a suction inlet and exhaust branch on each side of the Pump, covers being provided for the openings not in use. The discharge outlet is so arranged that the valve cover can be removed without breaking any pipe-joint. Plugs for draining the water cylinders are also provided.

All the branches are arranged to take flanged pipes.

One gun-metal lubricator, four condensed steam cocks, and a set of spanners are supplied with the Pump.

Each Pump is tested with steam and water before leaving the Works.

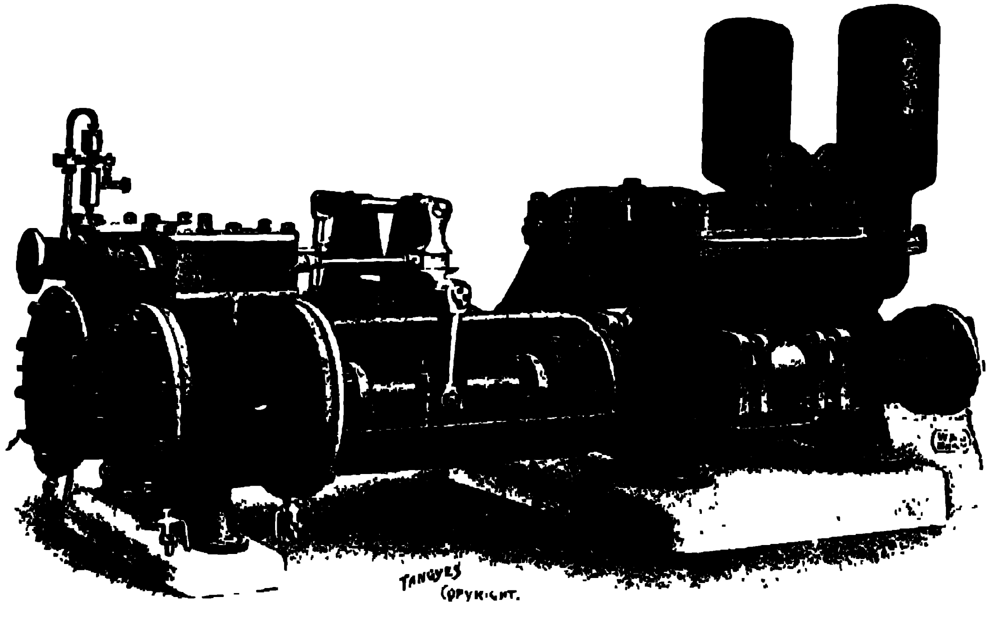
Diameter of steam cylinders .. ins.	4½	5½	6	6	6
„ „ pumps .. „	3¼	4¼	6	7	8
Length of stroke .. .. „	4	5	6	8	8
Water per hour, approx. Imperial galls.	1,700 to 2,800	3,600 to 5,500	7,300 to 11,000	12,000 to 18,000	15,500 to 23,500
Water per hour, approx. Imperial tons	7½ to 12½	16 to 24½	32½ to 49	53 to 80	69 to 105
Piston speed .. ft. per min.	30 „ 50	40 „ 60	50 „ 75	60 „ 90	60 „ 90
Diameter of suction inlets .. ins.	2½	3	4	4½	5
„ „ delivery outlet .. „	2½	3	4	4½	5
„ „ steam inlet .. „	½	¾	1	1	1
„ „ exhaust outlets „	¾	1	1¼	1¼	1¼
Approx. weight .. cwts.	4¾	7	10	15½	17½
Price, ... Rs.	695	865	1,180	1,475	1,680

Diameter of steam cylinders .. ins.	7	7	7	8½	10
„ „ pumps .. „	7	8	9	10	10
Length of stroke .. .. „	8	8	8	10	10
Water per hour, approx. Imperial galls.	12,000 to 18,000	15,500 to 23,500	19,500 to 29,000	28,000 to 40,000	28,000 to 40,000
Water per hour, approx. Imperial tons	53 to 80	69 to 105	87 to 130	125 to 180	125 to 180
Piston speed .. ft. per min.	60 „ 90	60 „ 90	60 „ 90	70 „ 100	70 „ 100
Diameter of suction inlets .. ins.	4½	5	6	7	7
„ „ delivery outlet .. „	4½	5	6	7	7
„ „ steam inlet .. „	1½	1½	1½	1¾	2
„ „ exhaust outlets „	2	2	2	2¼	2½
Approx. weight .. cwts.	18½	20½	22½	29	33

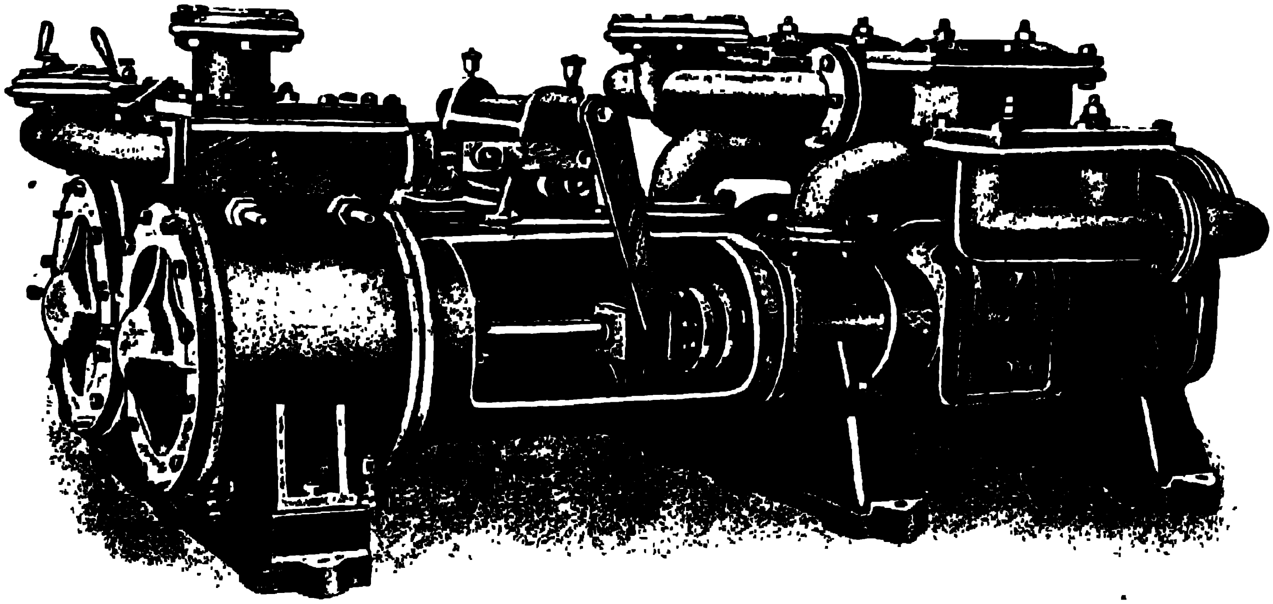
Duplex Steam Pumps.

Centre-packed Ram Type.

For 450 feet "Heads."—Maximum Steam Pressure 100 lbs. per square inch.



18 × 8 × 10-ins. sizes.



"Phœnix" Special Duplex Ram Type Pump. For 600 Feet "Heads."

See page 753 for advantages of Ram Type Pumps.

For Descriptions see opposite page.

Tangye's Duplex Pumps. Centre-packed Ram Type.

(See illustration on opposite page.)

In this series the pump-end is suitable for working against "heads" up to **450 feet** (equal to 195 lbs. per square inch), and the steam cylinders for pressures up to **100 lbs. per square inch.** The "head" against which any pump will work depends upon the relative diameters of steam cylinders and rams, and the steam pressure available, and in selecting a pump care must be taken that neither of the pressure limits is exceeded.

The term "**head**" means the total vertical height of suction and delivery, plus the friction of the water through pipes, bends, valves, etc.

Specification.

The piston rods are of muntz metal in pumps having steam cylinders up to and including 10 inches diameter, and of steel in sizes above this. They are fitted with cast-iron pistons and rings, and work through patent anti-friction stuffing box glands. The pump end has cast-iron rams working through gun-metal lined stuffing boxes in the centre of the bodies which can be packed from the outside and tightened without stopping the pump. The valves are of brass The pump barrels are connected together on cast-iron distance pieces, and are each fitted with an air vessel on the discharge branch. A vacuum vessel is also provided for the suction inlet. The suction inlets are connected by one large junction piece which avoids the use of two suction pipes. One gun-metal sight-feed lubricator, four condensed steam cocks, and a set of spanners are supplied with the pump Small plugs for draining the water cylinders are also provided. Each pump is tested with steam and water before leaving the Works.

Particulars and Prices of Standard Sizes.

Diameter of steam cylinders ..	ins.	12	12	12	14	14	14	14	16
" " rams	"	6	7	8	5	6	7	8	6
Length of stroke	"	10	10	10	10	10	10	10	10
*Water per hour, approx. Imperial galls		10,390	14,370	18,960	6,690	10,050	14,030	18,620	9,850
Diameter of suction inlet ..	ins	5	6	7	4	5	6	7	5
" " delivery outlet ..	"	4	5	6	3½	4	5	6	4
" " steam inlet ..	"	2	2	2	2½	2½	2½	2½	2½
" " exhaust outlet ..	"	2½	2½	2½	3	3	3	3	3
Weight, approx. ..	cwts.	36	43	55	36¼	40	47	72	47
Price, ...	**Rs.**	**3,450**	**4,250**	**5,000**	**3,240**	**3,800**	**4,600**	**5,370**	**3,440**

Diameter of steam cylinders ..	ins.	16	16	18	18	18	20	20	21
" " rams	"	7	8	6	7	8	7	8	10
Length of stroke	"	10	10	10	10	10	10	10	15
*Water per hour, approx. Imperial galls		13,830	18,420	9,630	13,600	18,190	13,100	17,700	30,000
Diameter of suction inlet ..	ins.	6	7	5	6	7	6	7	8
" " delivery outlet ..	"	5	6	4	5	6	5	6	7
" " steam inlet ..	"	2½	2½	3	3	3	4	4	4½
" " exhaust outlet ..	"	3	3	3½	3½	3½	5	5	5
Weight, approx. ..	cwts.	54	66	53	60	71	67	79	146
Price, ...	**Rs.**	**5,050**	**5,800**	**4,860**	**5,640**	**6,460**	**6,560**	**7,360**	..

*These quantities of water are equal to the calculated displacement of the pump buckets when running at 75 feet per minute

When desired we can offer smaller sizes of pumps of this design.

"Phoenix" Duplex Ram Type Pump.

For "Heads" up to 600 feet.

We illustrate opposite a design of Duplex Ram Pump which we have made to suit particular constituents' requirements. The special features of this pump are separate interchangeable valve boxes, special method of fixing valve seats, convenient arrangements for examining valves and re-making joints, and renewable crossheads. The last named feature is greatly appreciated by users. The crossheads are fitted with renewable steel guides for the valve motion rollers. When the guides become worn they can be replaced in half an hour without the necessity for withdrawing the pump rods.

Tangye's Duplex Steam Pumps.

Mine Pump. Outside Valve Box Ram Type.

600 Feet "Head."—100 lbs. Steam Pressure.

In this series the pump-end is suitable for working against "heads" up to **600 feet** (equal to 260 lbs. per square inch), and the steam cylinders for pressures up to **100 lbs. per square inch.** The "head" against which any pump will work depends upon the relative diameters of steam cylinders and rams, and the steam pressure available, and in selecting a pump care must be taken that neither of the pressure limits is exceeded.

The term **"head"** means the total vertical height of suction and delivery, plus the friction of the water through pipes, bends, valves, etc.

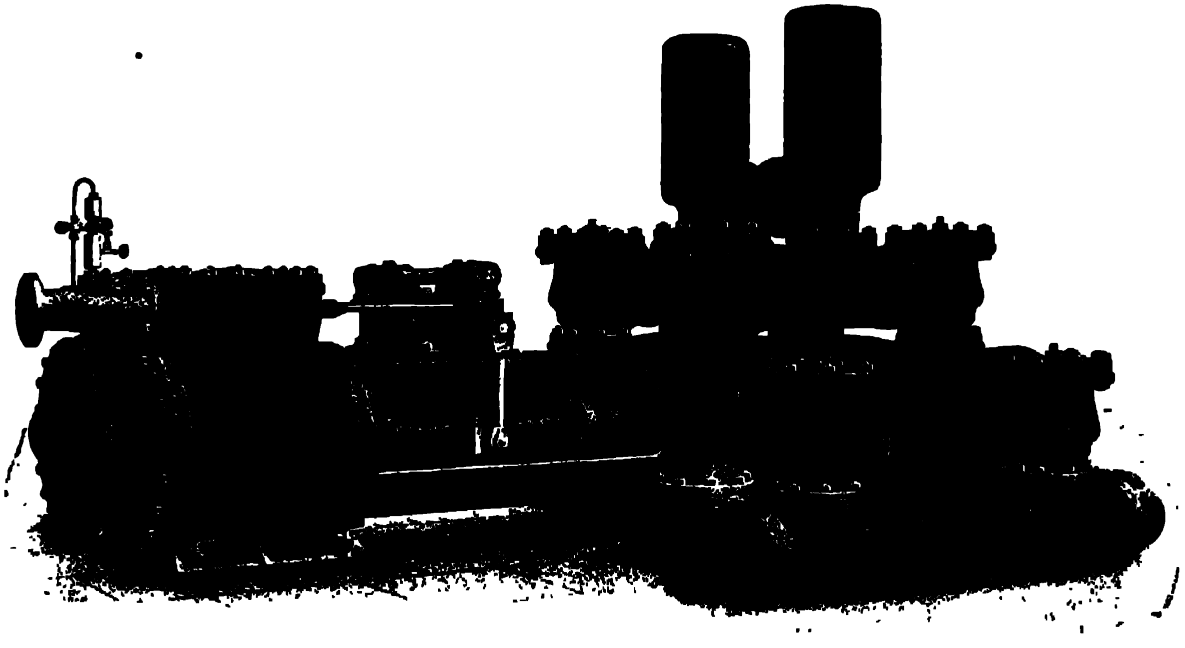


Illustration of the Outside Valve Box Ram Pump, 600 Feet Series.

This is specially designed for Mine work, and similar duties requiring a pump of substantial and heavy construction.

All the valve boxes are alike, so that it is only necessary to keep one of any given pump as spare; the valves and seats are of gun-metal, giving ample area for the water, and are easily accessible. Bolts are used (not studs) throughout the water-end except for the glands.

See page 753 for advantages of Ram Type Pumps.

For particulars and sizes see next page.

**CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,**

**JESSOP & Co. LTD
ENGINEERS**

**RANGOON, MADRAS,
BOMBAY, LONDON.**

Tangye's Duplex Steam Pumps.

Mine Pump. Outside Valve Box Ram Type.

600 Feet "Head."—100 lbs. Steam Pressure.

The Pump is fitted with cast-iron pistons and rings, cast-iron rams, each working through two gun-metal lined glands and two gun-metal neck bushes in the Pump body, and steel piston rods. The valves and seats are of gun-metal and of special design: they are placed in separate valve boxes provided with covers for easy access.

Two air vessels are fitted and coupled together to form one discharge branch, and a vacuum vessel is provided for each side of the Pump.

A gun-metal lubricator is fitted on the steam breeches pipe; two gun-metal drain cocks on each steam cylinder and snifting cocks and air cocks on the valve boxes; a set of spanners is also supplied.

Each Pump is tested with steam and water before leaving the Works.

Diameter of steam cylinders		18	18	18	18	18	18	21	21	21
„ „ rams		7	8	9	10	11	12	7	8	9
Length of stroke		15	15	15	15	15	15	15	15	15
Water per hour, approx.	**Imperial galls.**	13,600	18,190	23,400	29,100	35,600	42,600	13,100	17,700	22,900
Diameter of suction inlet ..	.. ins.	7	7	8	8	9	9	7	7	8
„ „ delivery outlet ..	.. „	6	6	7	7	8	8	6	6	7
„ „ steam inlet ..	.. „	3	3	3	3	3	3	4½	4½	4½
„ „ exhaust outlet ..	.. „	3½	3½	3½	3½	3½	3½	5	5	5
Weight, approx.	.. cwts.	126	126	153	153	206	206	145	145	182

Diameter of steam cylinders		21	21	21	24	24	24	24	24	26
„ „ rams		10	11	12	8	9	10	11	12	9
Length of stroke ..		15	15	15	15	15	15	15	15	18
Water per hour, approx.	**Imperial galls**	28,600	35,000	42,000	17,100	22,300	28,000	34,500	41,500	21,600
Diameter of suction inlet	ins.	8	9	9	7		8		9	8
„ „ delivery outlet		7	8	8	6		7		8	7
„ „ steam inlet		4½	4½	4½	5		5	5	5	5
„ „ exhaust outlet		5		5	6	6	6	6	6	6
Weight, approx. ..	cwts.	182		225	162	199	199	243	243	220

Diameter of steam cylinders	**.. ins.**	26	26	26	28	28	28	30	30
„ „ rams ..		10	11	12	10	11	12	11	12
Length of stroke ..		18	18	18	18	18	18	18	18
Water per hour, approx. ..	**Imperial galls.**	27,400	33,900	40,900	26,600	33,100	40,200	33,100	40,200
Diameter of suction inlet..		8	9	9	8		9	9	9
„ „ delivery outlet		7	8	8	7		8	8	8
„ „ steam inlet		5	5	5	5	5	5	6	6
„ „ exhaust outlet		6	6	6	7	7	7	8	8
Weight, approx. ..	cwts.	220	259	259	238	282	282	322	322

The quantities stated are for clear cold water, and are equal to the calculated displacement of the rams when running at a speed of 75 feet per minute.

It should be noted that in each case a reduction has been made for the displacement of the piston rods.

Compound Steam Pumps.—For large sizes where higher steam pressures are available we can quote for Compound Duplex Pumps.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Special" Steam Pumps.

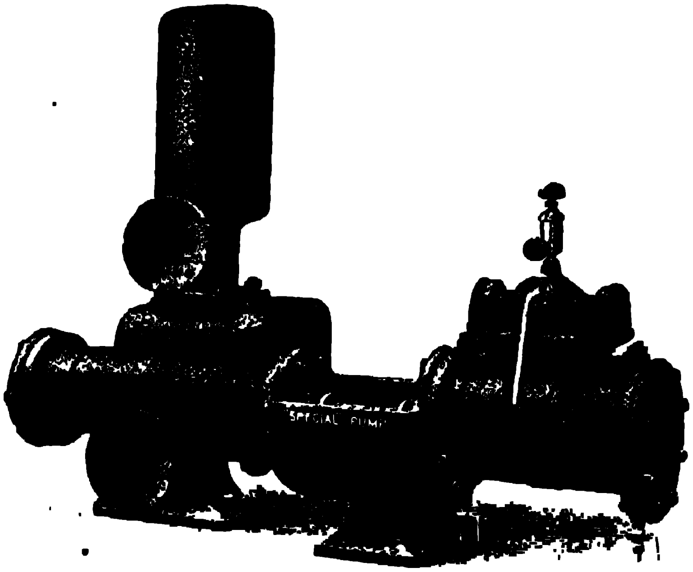


Illustration of the 300 Feet Series, 12-in. stroke Pump, with Suction Inlet and Delivery Outlet in front.

The **Tangye's "Special" Steam Pump** was among the first direct-acting steam pumps introduced, and—in spite of the many rival types brought out since—still holds its position in the foremost rank. Thousands of these pumps are in use in all parts of the world, performing every kind of duty under the most varied conditions. The designs shown in the following pages embody the results of the latest experience in their use and manufacture.

The "Special" Pump occupies the **smallest possible space;** it has the **fewest working parts** in comparison with any pump of a similar class, and **none of them are delicate. The entire absence of external valve gear, operating rods, links and pins** eliminate a constant source of wear and trouble.

The steam cylinders are so constructed that all the steam is utilised **for effective work** on the pistons.

In the arrangement for operating the slide valve there is a **total absence of minute steam passages,** grooves, packing rings, pipes, etc. It is absolutely **the simplest of any valve mechanism,** and is **entirely enclosed.**

The pump can be relied upon to make a **full stroke** under all working conditions.

The pump is **certain in action,** and will start from **any point** by simply turning on the steam; there is **no dead centre.** It can be run at **full speed,** or **creeping speed,** or **dead slow** as may be required. It automatically slows down at the end of **each stroke,** and the valve gear and steam ports are so constructed that, should the suction water fail, the piston **does not** strike the covers when running at excessive speed.

The simplicity and reliability of the Tangye's "Special" Pump has led to its introduction for all services where continuity of work is the prime essential. There are thousands of these pumps at work in Indian collieries, on the railways, and for numerous other pumping jobs where the essential requirement is for a pump which will stand the roughest usage and continue to perform satisfactorily.

CALCUTTA, JAMSHEDPUR, **DELHI, LUCKNOW,**

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS, **BOMBAY, LONDON.**

Tangye's "Special" Steam Pumps.

300 Feet Series.

12-inch Stroke.—100 lbs. Steam Pressure.

The Pump is fitted with cast-iron piston and rings, cast-iron bucket with leather packings, gun-metal valves and seats and steel piston rod.

The suction inlet is at the back of the Pump, but this can be arranged in the front if so ordered. The delivery outlet on the air vessel can be arranged at the back or the front.

A gun-metal lubricator is fitted on the steam chest, and two gun-metal drain cocks on the steam cylinder; a set of spanners is also supplied.

Litho foundation drawings giving principal dimensions can be supplied to buyers.

Each Pump is tested with steam and water before leaving the Works.

Diameter of steam cylinder	**ins.**	**5**	**5**	**5**	**5**	**6**	**6**	**6**	**6**	**7**	**7**
" " pump	**"**	**2**	**3**	**4**	**5**	**3**	**4**	**5**	**6**	**3**	**4**
Length of stroke	**"**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx.	**Imperial galls.**	**1,270**	**1,830**	**3,260**	**5,100**	**1,830**	**3,260**	**5,100**	**7,300**	**1,830**	**3,260**
* "Head" in feet per lb. steam pressure		5·7	5·9	2·1	1·3	5·8	[illegible]		1·3	8·0	4·4
Diameter of suction inlet	ins	2	[illegible]	3	3½		3		4	[illegible]	3
" " delivery outlet	"	2		3			3		4		3
" " steam inlet	"	¾	¾	¾			¾				1
" " exhaust outlet	"	1	1	1			1	1			1¼
Weight, approx.	cwts.	4	4½	6	7½	5	6½	8¼			7½
Price,	**Rs.**	**510**	**545**	**645**	**750**	**580**	**680**	**790**	**890**	**645**	**750**

Diameter of steam cylinder	**ins.**		**7**	**7**	**8**	**8**	**8**	**8**	**8**	**9**	**9**
" " pump	**"**	**5**	**6**	**7**	**4**	**5**	**6**	**7**	**8**	**4**	**5**
Length of stroke	**"**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx.	**Imperial galls.**	**5,100**	**7,300**	**9,900**	**3,260**	**5,100**	**7,300**	**9,900**	**13,000**	**3,260**	**5,100**
* "Head" in feet per lb steam pressure		[illegible]	1·9	1·3		[illegible]			1·4	7·6	4·8
Diameter of suction inlet	ins	3½	4	5		3½	4		6	3	3½
" " delivery outlet	"	3½	4	5	3	3½	4		6	3	3½
" " steam inlet	"		1	1	1	1	1		1	1¼	1¼
" " exhaust outlet	"		1¼	1¼	1¼	1¼	1¼		1¼	1½	1¼
Weight, approx.	cwts.	9	10¾	13¾	8¼	10	11¾	14¼	17¼	9½	11¼
Price,	**Rs.**	**850**	**960**	**1,160**	**825**	**925**	**1,060**	**1,220**	**1,400**	**890**	**990**

Diameter of steam cylinder	**ins.**	**9**	**9**	**9**	**9**	**10**	**10**	**10**	**10**	**10**	**10**
" " pump	**"**	**6**	**7**	**8**	**9**	**5**	**6**	**7**	**8**	**9**	**10**
Length of stroke	**"**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx.	**Imperial galls.**	**7,300**	**9,900**	**13,000**	**16,500**	**5,100**	**7,300**	**9,900**	**13,000**	**16,500**	**20,300**
* "Head" in feet per lb. steam pressure		3·3	2·4	·8	1·4	6·1	4·2	3·0	2·3	1·8	1·4
Diameter of suction inlet	ins.	4	5	6	7	3½	4	5	6	7	8
" " delivery outlet	"	4	5	6	7	3½	4	5	6	7	8
" " steam inlet	"	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
" " exhaust outlet	"	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½
Weight, approx.	cwts.	12¾	15¾	18¼	24	12¼	13¾	17	19¼	25	30
Price,	**Rs.**	---	---	**510**	**1,710**	**1,090**	**1,260**	**1,440**	**1,610**	**1,810**	**2,040**

The quantities stated are for clear cold water, and are equal to the calculated displacement of the Pump buckets when running at a speed of 100 feet per minute. In selecting a Pump, a deduction must be made from the theoretical quantity to allow for loss by leakage, slip, etc

*The "Head" in feet per lb. of steam pressure is calculated on 50 lbs. per square inch at the cylinder, which is a usual working pressure.

This data is given merely as a general guide in the selection of a Pump, as with high pressures the figures may be somewhat more, while with lower pressures they will probably be less. In no case should a Pump be put down to work with less than 20 lbs. per square inch.

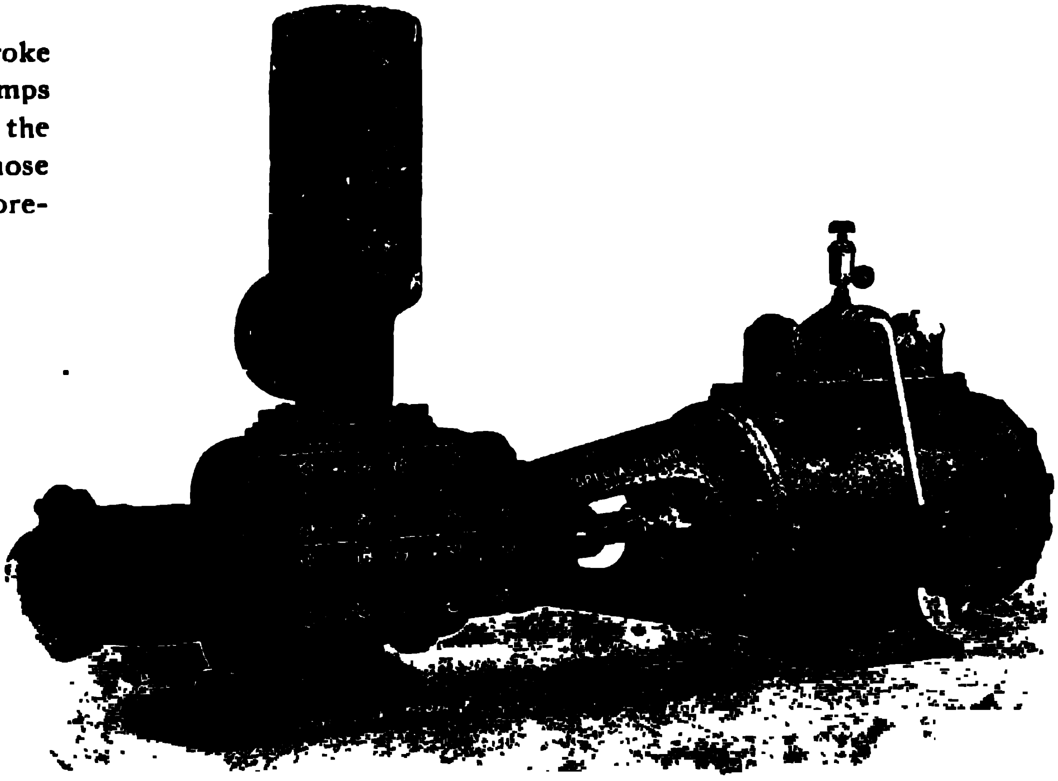
Tangye's "Special" Steam Pump.

300 Feet Series.—24-inch Stroke.

The 24-inch stroke "Special" Pumps are generally the same as those described in the previous pages.

The equipment of each Pump includes a gun-metal lubricator, two gun-metal drain cocks and a set of spanners.

We stock all sizes in general demand for colliery purposes.



Diameter of steam cylinder	.. **ins.**	**12**	**12**	**12**	**12**	**12**	**12**	**14**	**14**
" " pump	.. **"**	**6**	**7**	**8**	**9**	**10**	**12**	**6**	**7**
Length of stroke	.. .. **"**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**
Water per hour, approx.	**Imperial galls.**	**7,300**	**9,900**	**13,000**	**16,500**	**20,300**	**29,300**	**7,300**	**9,900**
* "Head" in feet per lb. steam pressure		6·1	4·4	3·3	2·6	2·1	1·4	8·5	6·1
Diameter of suction inlet	.. ins.	4	5	6	7	8	9	4	5
" " delivery outlet	.. "	4	5	6	7	8	9	4	5
" " steam inlet	.. "	1½	1½	1½	1½	1½	1½	2	2
" " exhaust outlet	.. "	2	2	2	2	2	2	2½	2½
Weight, approx.	.. cwts.	20	23	26	30	35	41	24	28
Price,	.. .. **Rs**	**1,395**	**1,565**	**1,675**	**1,950**	**2,230**	**2,580**	**1,640**	**1,750**

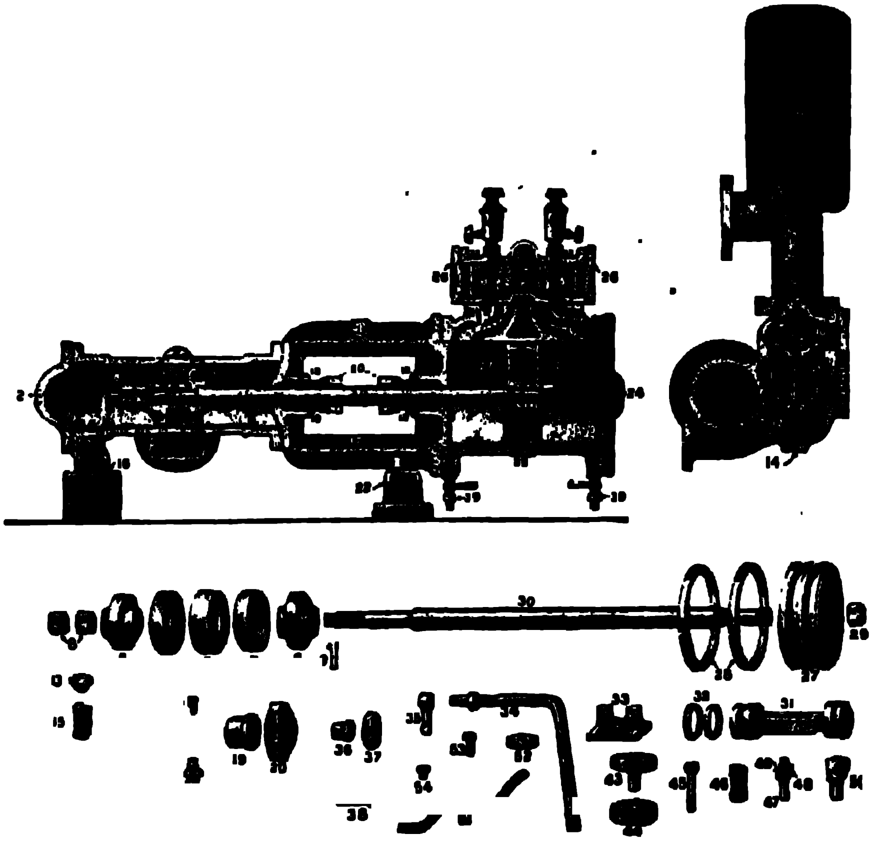
Diameter of steam cylinder	.. **ins.**	**14**	**14**	**14**	**14**	**14**	**16**	**16**	**16**
" " pump	.. **"**	**8**	**9**	**10**	**12**	**14**	**6**	**7**	**8**
Length of stroke	.. .. **..**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**
Water per hour, approx.	**Imperial galls.**	**13,000**	**16,500**	**20,300**	**29,300**	**39,900**	**7,300**	**9,900**	**13,000**
* "Head" in feet per lb. steam pressure		4·6	3·6	2·9	2·0	1·4	11·2	8·2	6·2
Diameter of suction inlet	.. ins.	6	7	8	9	10	4	5	6
" " delivery outlet	.. "	6	7	8	9	10	4	5	6
" " steam inlet	.. "	2	2	2	2	2	2	2	2
" " exhaust outlet	.. ..	2½	2½	2½	2½	2½	2½	2½	2½
Weight, approx.	.. cwts	31	35	40	46	60	34	38	41
Price,	.. .. .. **Rs.**	**1,920**	**2,170**	**2,400**	**2,700**	**3,345**	**1,920**	**2,230**	**2,370**

Tangye's "Special" Pump.

Class "B."

Parts for Renewals and Repairs.

1 Pump Body
2 Pump End Cover
3 Valve Box Covers
4 Air Vessel
5 Bucket Centre-piece
6 Bucket Ends
7 Bucket Leathers
8 Bucket Nuts
9 Pump Rod Cotter
10 Pump Valve
11 Pump Valve Seat
12 Pump Valve Spindle
13 Pump Valve Box Top Stopper
14 Pump Valve Box Bottom Stopper
15 Pump Valve Spring
16 Pump Foot
17 Distance Piece
18 Piston Rod Gland Packing
19 Piston Rod Gland
20 Piston Rod Gland Follower
21 Piston Rod Gland Follower Stud
22 Distance Piece Foot
23 Steam Cylinder
24 Steam Cylinder End Cover
25 Steam Chest
26 Steam Chest End Cover
27 Piston
28 Piston Rings
29 Piston Nut
30 Piston and Pump Rod
31 Steam Chest Plunger
32 Steam Chest Plunger Rings
33 Steam Slide Valve
34 Starting Handle
35 Starting Handle Lever



36 Starting Handle Gland
37 Starting Handle Gland Follower
38 Starting Handle Gland Follower Stud
39 Drain Cocks
40 Lubricators
41 Bye-pass Plugs in Steam Chest
42 Bye-pass Plugs in Steam Cylinder
43 Tappet Box Cover
44 Tappet Box
45 Tappet Box Stud
46 Tappet Spring
47 Tappet
48 Tappet Valve
49 Tappet Locking Piece
50 Tappet Bush
51 Tappet Pipe
52 Tappet Pipe Flange in Steam Chest
53 Tappet Pipe Flange Stud
54 Plug for Draining Exhaust Passage

When Enquiring for or Ordering Parts, quote the Number and Description given above, also state the Size and Number of the Pump, and the date when supplied.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Special" Steam Pump.

Centre-packed Ram Type.

450 Feet Series.—100 lbs. Steam Pressure.

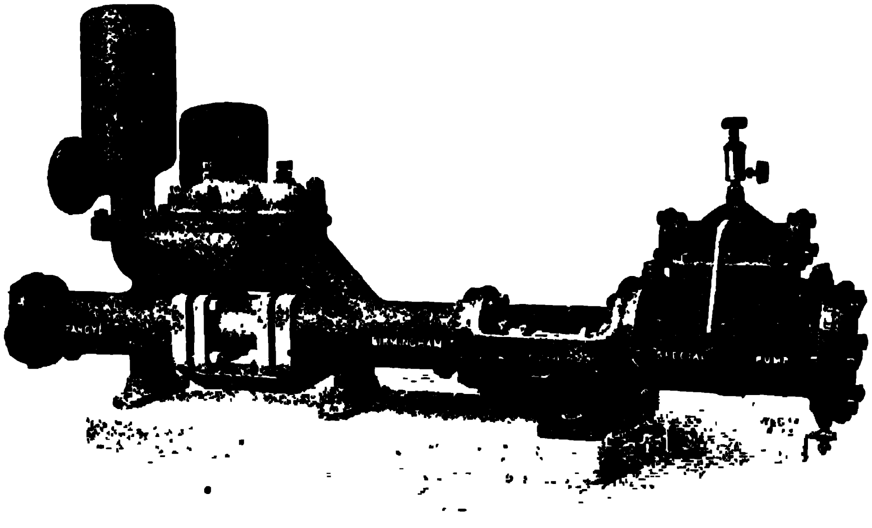


Illustration of the 450 Ft. Series, Centre-packed Ram Pump.

The Pump is fitted with cast-iron pistons and rings, cast-iron ram working through two gun-metal lined glands and two gun-metal neck bushes in the Pump body, and steel piston rod. The valves and seats are of gun-metal.

An air vessel of ample capacity is provided for the delivery outlet, and a vacuum vessel for the suction.

A gun-metal lubricator is fitted on the steam chest, and two gun-metal drain cocks on the steam cylinder; a set of spanners is also supplied.

Each Pump is tested with steam and water before leaving the Works.

Diameter of steam cylinder ..	**.. ins.**	**6**	**7**	**8**	**8**	**9**	**9**	**10**
„ „ ram ..	**.. „**	**3**	**3**	**3**	**4**	**3**	**4**	**4**
Length of stroke ..	**.. „**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx. ..	**Imperial galls.**	**1,250**	**1,230**	**1,200**	**2,270**	**1,170**	**2,240**	**2,210**
Diameter of suction inlet ..	.. ins.	2½	2½	2½	3	2½	3	3
„ „ delivery outlet	.. „	2½	2½	2½	3	2½	3	3
„ „ steam inlet ..	.. „	¾	1	1	1	1¼	1¼	1¼
„ „ exhaust outlet	.. „	1	1¼	1¼	1¼	1½	1½	1½
Weight, approx	cwts.	8½	9½	10	11½	11	12¼	13¼
Price, ...	**.. Rs.**	**800**	**835**	**865**	**1,040**	**945**	**1,120**	**1,235**

Diameter of steam cylinder		**10**	**12**	**12**	**12**	**14**	**14**	**14**
„ „ ram		**5**	**4**	**5**	**6**	**4**	**5**	**6**
Length of stroke		**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx.	**Imperial galls.**	**3,580**	**2,140**	**3,500**	**5,200**	**1,970**	**3,340**	**5,030**
Diameter of suction inlet ..	.. ins.	3	3	3	3½	3	3	3½
„ „ delivery outlet	.. „	3	3	3	3½	3	3	3½
„ „ steam inlet ..	.. „	1¼	1½	1½	1½	2	2	2
„ „ exhaust outlet	.. „	1½	2	2	2	2½	2½	2½
Weight, approx	cwts.	15	15¼	16½	19¼	17½	19	22
Price, ...	**.. Rs.**	**1,410**	**1,340**	**1,520**	**1,745**	**1,555**	**1,730**	**1,955**

Other sizes can be offered on receipt of particulars of duty required.

The quantities stated are for clear cold water and are equal to the calculated displacement of the ram when running at a speed of 75 feet per minute.

It should be noted that in each case a reduction has been made for the displacement of the piston rod

Litho Foundation Drawings giving principal dimensions can be supplied to buyers.

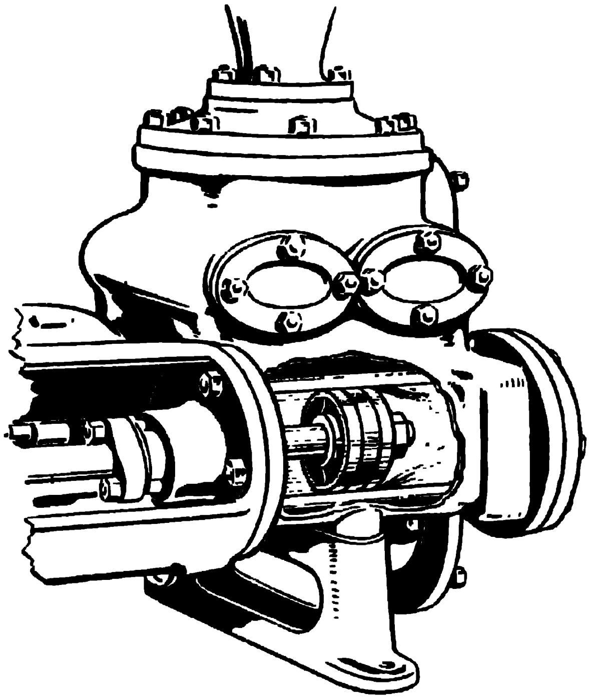
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Advantages of Ram Type Pumps.

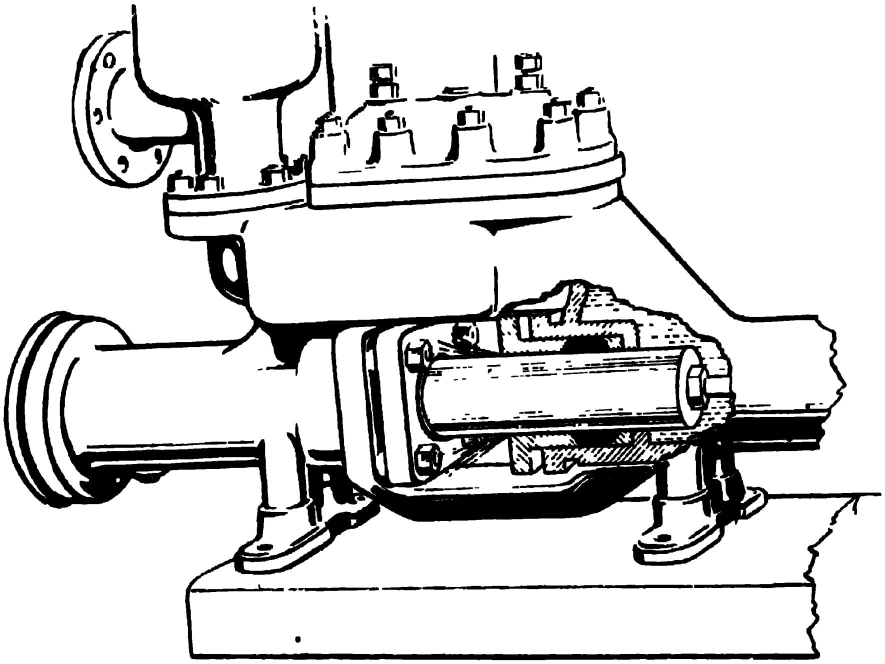
BUCKET TYPE.



Water End of Bucket Type Pump.

Showing internal leakage **not visible** or curable without dismantling pump.

RAM TYPE.



Water End Ram Type Pump.

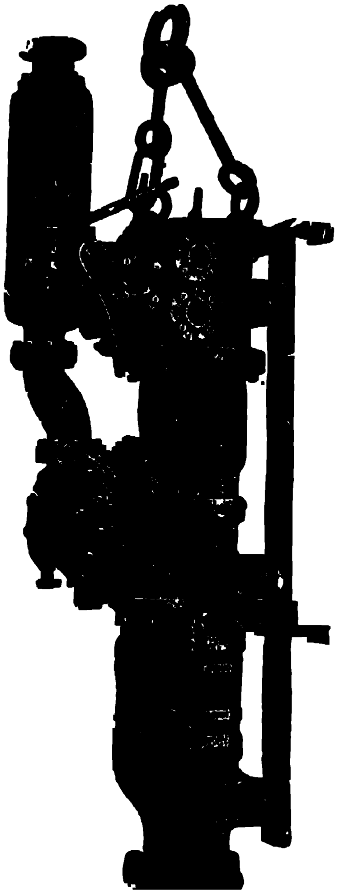
Showing external leakage **visible** to user and curable from outside.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Tangye's "Special" Steam Sinking Pump.—450 Ft. "Heads."



This class of Ram Pump is specially suited for sinking new shafts or wells, recovering flooded mines, and for general excavating work. It is compact in design, strongly made to withstand rough usage, has no outside valve gear, requires little room, and is constructed for dealing with dirty or gritty water. It will work equally well whether suspended or supported on timbers in the shaft.

In this type the pump-end is suitable for working against "heads" up to 450 feet, and for steam pressures not to exceed 100 lbs. per square inch.

The steam cylinder is fitted with starting handle, cast-iron piston and rings, and has patent adjusting screws for the slide valve, which can be adjusted while the Pump is running. The piston rod is of Muntz Metal in Pumps having steam cylinders up to and including 10 inches diameter; the larger sizes have steel rods These rods work through patent anti-friction stuffing-box glands.

The pump-end has a cast-iron Ram working through gun-metal lined stuffing-boxes in the centre of the body, which can be easily packed from the outside, and, if necessary, the packing may be tightened up while the Pump is running, hinged bolts being provided for easy access to the glands.

The valves are specially adapted for sinking purposes, and can be easily and quickly examined or taken out for cleaning, renewal, etc.

The Pump is provided with an attachment **for slinging in a shaft,** and has a wrought-iron frame work for supporting the Pump in the shaft when required

Two gun-metal lubricators, two gun-metal drain cocks, and a set of spanners are supplied with each Pump

Each Pump is tested with steam and water before leaving the Works.

Diameter of steam cylinder	**ins.**	**5**	**6**	**7**	**6**	**7**	**8**	**10**	**7**	**8**
„ „ ram	**„**	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**5**	**5**
Length of stroke	**„**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx.	galls.	1,800	1,800	1,800	3,200	3,200	3,200	3,200	5,000	5,000
Diameter of suction inlet	ins.	2½	2½	2½	3	3	3	3	3	3
„ „ delivery outlet	„	2½	2½	2½	3	3	3	3	3	3
„ „ steam inlet	„	¾	1	1¼	1	1¼	1½	1¾	1½	1½
„ „ exhaust outlet	„	1	1¼	1½	1¼	1½	1¾	2	1½	1¾
Height overall, approx	„	84	86	86	87	89	89	102	102	102
Width and depth, approx.	„	24×27	25×28	26×28	26×28	26×28	26×28	30×33	27×29	27×29
Approximate weight	cwts.	7½	8	8¾	11	11¾	12½	16	14½	15

Diameter of steam cylinder	**ins.**	**10**	**12**	**8**	**10**	**12**	**10**	**12**	**14**
„ „ ram	**„**	**5**	**5**	**6**	**6**	**6**	**7**	**7**	**7**
Length of stroke	**„**	**12**	**12**	**12**	**12**	**12**	**12**	**12**	**12**
Water per hour, approx	galls.	5,000	5,000	7,200	7,200	7,200	9,800	9,800	9,800
Diameter of suction inlet	ins.	3	3	4	4	4	5	5	5
„ „ delivery outlet	„	3	3	3½	3½	3½	4	4	4
„ „ steam inlet	„	1¾	2¼	1½	1¾	2¼	1¾	2¼	2½
„ „ exhaust outlet	„	2	2½	1¾	2	2½	2	2½	3
Height overall, approx.	„	102	118	106	118	118	128	128	128
Width and depth, approx.	„	30×33	40×38	29×38	40×38	40×38	44×39	44×39	44×39
Approximate weight	cwts.	18¼	20½	22	25	27½	28¾	32	34½

Prices on application.

Vertical Cornish Direct-Acting Sinking Pumps.

"Straight Line" Type.

Section

This illustration represents the "Straight Line" pattern of Vertical Cornish Direct-Acting Sinking Pump, Outside Packed Ram Type, for heads up to 300 feet; it is adapted for mining, sinking, draining, contractors and emergency work, and is arranged so as to be readily slung down within suction distance of the water.

The "Straight Line" pattern Sinking Pump is more extensively used than all other Outside Packed Ram Type Sinking Pumps made.

Sizes and Particulars.

Bore of steam cylinder		**6**	**7**	**8**	**9**	**10**	**10**	**12**	**12**	**12**
Diameter of Ram		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**12**
Length of Stroke		**12**	**12**	**12**	**12**	**12**	**12**	**24**	**24**	**24**
Diameter of suction inlet	ins.	3	4	5	6	7	8	9	10	12
„ „ delivery outlet	„	2½	3	3½	4½	5	6	7	8	9
„ „ steam inlet	„	¾	1¼	1¼	1½	1½	1½	2	2	2
„ „ „ exhaust	„	1	1½	1½		2	2	2½	2½	2½
Quantity raised per hour	galls.	1,830	3,260	5,100	7,340	9,990	13,050	16,520	20,400	29,370
Height water raised, 50 lbs. steam	ft.	300	234	196	172	156	119	136	110	75
Approximate weight	cwts.	7	9½	13½	20	31	41	64	78	93

Bore of steam cylinder	**ins.**	**16**	**16**	**18**	**18**	**20**	**20**	**21**	**22**	**24**
Diameter of Ram		**10**	**12**	**10**	**12**	**10**	**12**	**10**	**12**	**12**
Length of stroke		**24**	**24**	**24**	**24**	**24**	**24**	**24**	**24**	**42**
Diameter of suction inlet	ins.	10	12	10	12	10	12	10	12	12
„ „ delivery outlet	„	8	9	8	9	8	9	8	9	9
„ „ steam inlet	„	2½	2½	3	3	3	3	3½	3½	4
„ „ „ exhaust	„	3	3	3½	3½	3½	3½	4	4	5
Quantity raised per hour	galls.	20,400	29,370	20,400	29,370	20,400	29,370	20,400	29,370	29,370
Height water raised, 50 lbs. steam	ft.	196	136	248	172	300	212	300	257	300
Approximate weight	cwts.	84	99	87	102	92	107	95	115	120

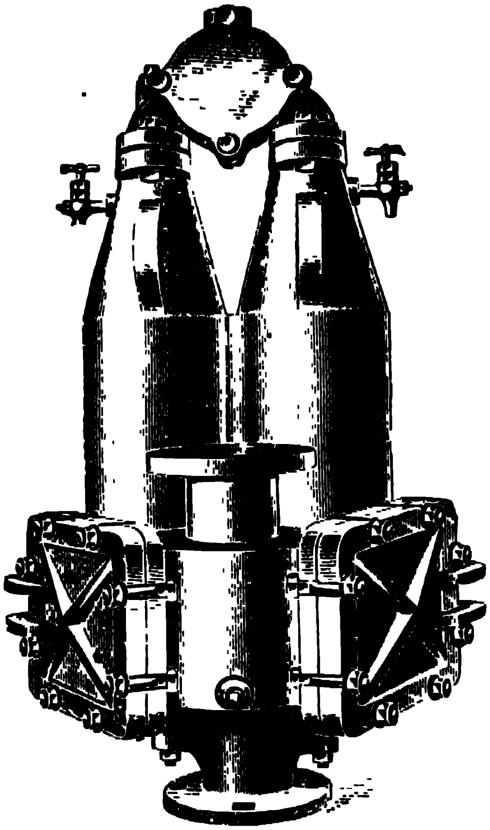
Prices on application.

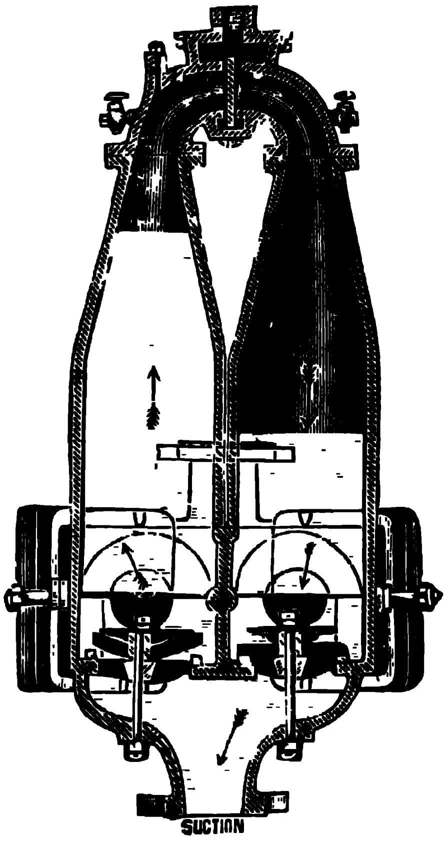
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Challenge" Pulsating Steam Pumps.





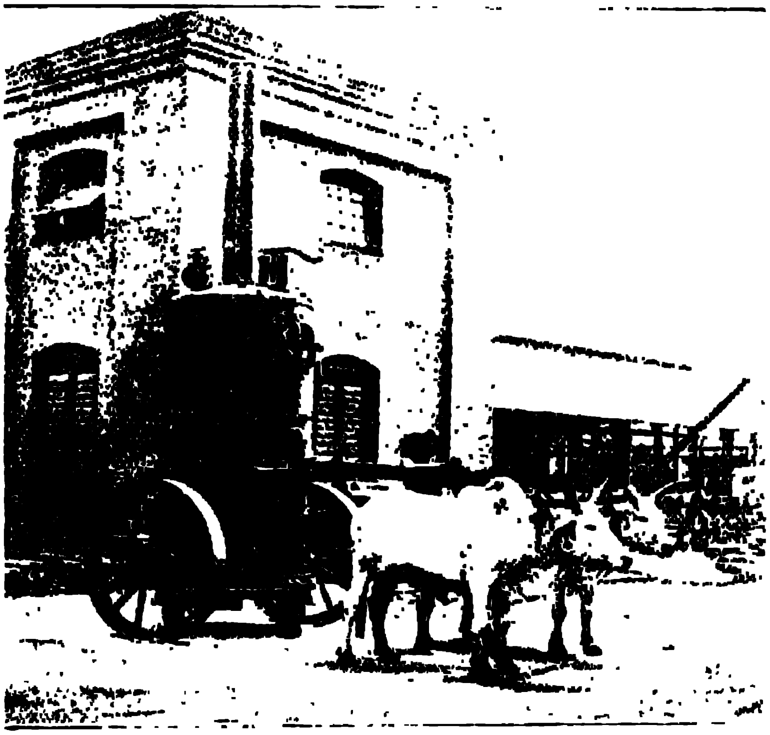
The "Challenge" Pulsating Pump, fitted with improved Pulsating valve, is the simplest and most durable Pump made. It has no glands, rods or pistons requiring lubrication and attention, all the working parts being simple valves. The valve seatings (the only working parts) are easily removable being fastened down by one long bolt in lieu of the usual studs which are liable to break, causing trouble and annoyance. The Pump will work suspended by a rope or chain, and is effectively adapted for pumping thick or heavy liquors, or water containing a large quantity of sand, gravel, mud, dirt, coaldust, etc. In fact it may be advantageously applied wherever a handy Pump is required for lifting water or semi-liquids in quantities. It will lift and force 90 feet vertical height with 80 lbs. steam pressure and proportionally higher as the pressure increases.

In case when the total vertical lift exceeds the maximum obtainable with the steam pressure carried, two or more of these Pumps may be advantageously connected, so that water may thus be lifted a height of several hundred feet with Boiler pressure as low as 60 to 80 lbs.

Particulars of Standard Sizes.

Size No.	1	2	3	4	5	6	7	8	9	10	11	12
Gallons per hour at 20 ft lift.	1,200	2,000	3,500	6,000	8,000	10,000	14,000	20,000	28,000	38,000	50,000	65,000
Size of Steam Pipe ins	½	⅜	½	½	¾	¾	1	1¼	1¼	1½	2	2
„ Suction „ „	1½	2	2½	3	3½	4	5	6	7	8	9	10
„ Delivery „ „	1¼	1½	2	2½	3	3½	4	5	6	7	8	9
Approx. weight of Pump cwts	1	1½	2	3¼	4½	6	8	12	14	17½	22	30
Size of Boiler required N.H.P.	3	3	3	6	8	8	10	14	18	..	..	..
Price, ... Rs.	**250**	**340**	**465**	**620**	**775**	**930**	**1,180**	**1,550**	**2,015**	**2,480**	**3,100**	**3,720**

Portable Steam Pumping Sets.



The smaller sized Duplex Ballast Type and Pulsating Pumps supplied by us can be arranged as Portable Pumping Sets as shown in the above illustration and as such they are particularly suitable for quarries, mining districts or railway constructional work where the pumping plant has to be moved from place to place over rough roads.

The Boiler can be of the Improved Vertical Cross-Tube or a Cochran Multitubular type as described in the Engine and Boiler section, and is specially constructed to meet the requirements of the Indian Boiler Act for boilers of 100 lbs. working pressure.

The carriage is of substantial construction, the wheels and supporting ring are of heavy tee section well gussetted: a bracket fixed on the back of the boiler supports the pump.

Sizes of Pulsating Pumps and Boilers.

Capacity Gallons per hour.	Size of Boiler.		Diameter of Suction.	Diameter of Delivery.
	N.H.P.	Diameter and Height.		
2,000	3	2′ 6″ × 6′ 0″	2″	1½″
3,500	4	2′ 10″ × 6′ 9″	2½″	2″
6,000	6	3′ 5″ × 7′ 9″	3″	2½″
8,000	8	3′ 9″ × 8′ 6″	3½″	3″
10,000	10	4′ 3″ × 9′ 5″	4″	3½″

Prices on application.

Hand Pumps.

Introduction.

As intending buyers may be in some doubt as to which of the numerous types of hand pumps offered in the following pages will be most suitable to their requirements, we offer the following general notes as a guide in making a selection:—

Capacity and Lift.—It will be noted that pumps of widely ranging capacity are listed for apparently the same lifts and—as it is natural to get as much as possible for one's money—the buyer is likely to order the pump which is capable of handling the largest quantity of water per hour. Generally, it may be said that large capacity hand pumps are only suitable for very low lifts and in order to obtain the listed output they may require more than one man to work them. It should be realised that the force necessary to work a pump increases in proportion to the quantity of water lifted per hour and *also* in proportion to the total height through which the water is lifted. It is obvious that one man can only do a certain amount of work and it is necessary to know how much a man can do in order to select a suitable type of pump for the job in view.

The following figures will serve as a practical guide:—

One man can pump

3,000	gallons per hour on a lift of	3	feet.	900	gallons per hour on a lift of	10	feet.
1,800	„ „ „ „ „ „ „	5	„	600	„ „ „ „ „ „ „	15	„
1,300	„ „ „ „ „ „ „	7	„	450	„ „ „ „ „ „ „	20	„

It will be noted that the quantity of water gets less as the height it is raised increases. For any particular lift the quantity of water which can be raised. hand power can be estimated thus:—

$$\frac{9{,}000 \times N}{H}$$

where H is the total height the water is raised in feet and N the number of men who will work the pump together.

Suction Lift.—It is always advisable to arrange for as short a suction lift as possible. The maximum practicable suction lifts may be taken as 25 feet but for ordinary pumps 20 feet and for some types 15 feet should be taken as the limit. It should be understood that the suction lift should always be included in the total height the water is raised.

Piping.—Cases of pumping through long pipes should be referred to us. All short bends and elbows in pipes should be avoided. Suction pipes should rise gradually towards the pump and all joints should be carefully made.

Types of Pumps for Special Duties.

(1) **Low Lift Contractors' Pumps.**—Figures 1223, 829 and 205 are recommended for contractors' work

(2) **Ships' Pumps.**—The Portable type on planks and Figures 470, 1440, 1524 and 1409 are suitable

(3) **Domestic Supply Pumps.**—Figures 1440, 297½, 1242, 200 (semi-rotary), 1408, 1580 (cistern type), 205½, Abyssinian Tube Wells and No. 1653 Deep Well Pump.

(4) **Deep Well and Railway Pumps.**—Phœnix Double Acting, Phœnix Double Plunger, "Aquatole" and Single and Double Brass Barrel Pumps are suitable for use in wells.

New Diaphragm Suction Pump. Fig. 1223.

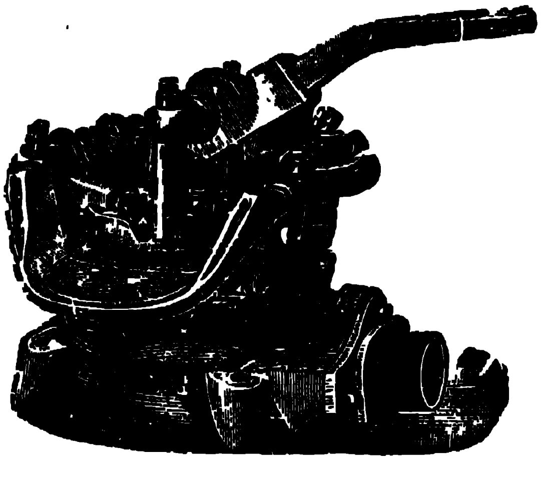


Fig. 1223.

The design combines simplicity and strength. It is invaluable for handling muddy or gritty water or sewage, as the foreign substances in the water cannot injure the pump. The pump may be used for pumping out excavations, cellars, trenches, quarries, and as a bilge pump on vessels, barges, dredgers, etc. The diaphragm is made of the best quality of rubber and takes the place of a plunger. The side suction valve is metal, rubber-faced resting on an inclined seat. The lever is wrought-iron and is reversible, so it can be used vertically or horizontally from either side or the back of the pump. The water-ways are large and ample, designed to handle a large amount of water. Suction screwed for iron pipes. We can supply hose and couplings.

Particulars and Prices.

No.	Suction.	Lift.	Approximate Capacity.*	Approx. Weight.	Price.	Foot Valve Screwed End.	Spare Rubber Diaphragm.
	3 ins.	20 ft.	3,500 gallons per hour.	178 lbs	**Rs. 180**	**Rs. 20**	**Rs. 15**

"New Deluge" Suction Pump. Fig. 829.

With Brass-lined Cylinder and Removable Valves.

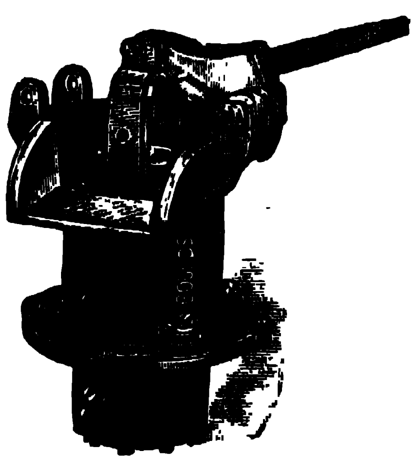


Fig. 829.

The Improved "New Deluge" Pump is designed for shallow or small vessels of not more than 15 to 20 feet depth of hold; it is also suitable where large quantities of water from excavations have to be dealt with. For contractors, for irrigation or any other purpose where a capacious pump is required, this is a suitable type.

The Cylinder is lined with brass, the valves rubber-faced, and the lever socket made at such an angle that the bent wrought-iron lever when put in one side up, is right for ordinary pumping, and by simply changing it to the other side up, it becomes a vertical lever. This lever may also be worked from three different points.

All working parts are easy of access. The cylinder may be removed from base or tail-piece by simply unscrewing base bolts. At the bottom of the base is bolted a flange which may be cut for any size of pipe. In our stock pumps this flange is screwed to suit gas pipe of the size given in the table below.

Particulars and Prices.

Diameter of Cylinder.	Stroke.	Capacity per Stroke.	Suction.	Lift.	Price of Pump.	Foot Valve Each.
Inches.	**Inches.**	**Gallons.**	**Inches.**	**Feet.**	**Rs.**	**Rs.**
6	**4**	**½**	**2½**	**20**	**170**	Screwed **12**
8½	**6**	**1½**	**3**	**20**	**220**	Flanged **30**

See Note in Introduction.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Double Barrel Contractors' Pumps.

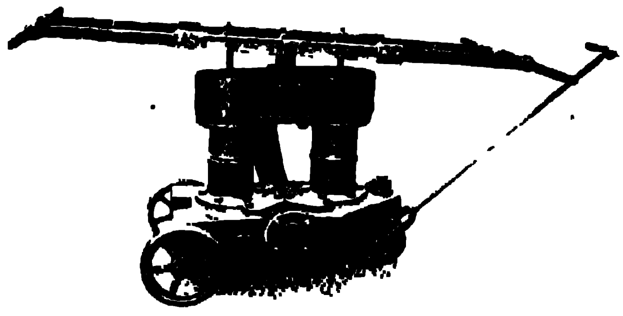
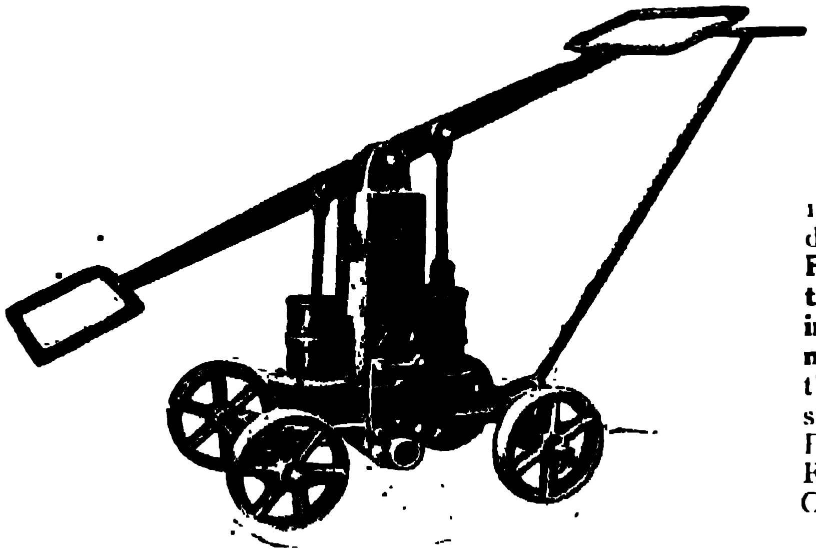


Fig. 205.

The Portable Contractors' Lift Pump here illustrated is largely used by railway construction engineers, building contractors and others and is designed for large volumes of water. The Pump is provided with Cast-Iron Bored Barrels, Wrought-Iron Cistern Head Levers with Hinged Connecting Rods to Buckets. The Barrels are mounted on a strong Cast-Iron Bed which is provided with three wheels with drag-handle. All parts are strong and substantially made to withstand the rough usage a Pump of this description is likely to meet with. The Ball and Socket Joint permits a single straight length of W I Suction Piping to be used and makes an expensive hose pipe unnecessary.

Particulars and Prices.

Bore of Working Barrels.	Length of Stroke	Discharge per our at 30 Strokes per Minute.	Diameter of Suction.	Diameter of Delivery.	**Prices.** Pump with Ball and Socket Joint.
Inches.	Inches	Gallons.	Inches.	Inches.	**Rs.**
6	9	6,000	3	3	**600**
8	14	9,000	4	4	**850**



Portable Fire Engine.

The Pump is mounted on a strong iron carriage with four wheels, drag-handle and turn carriage. **The Pump Barrels are of Gun-metal and the Valves are so arranged as to be immediately accessible by the removal of a door.** The whole is of the simplest construction and of strong and durable character. The Pump will prove invaluable as a Farm and Factory Fire Engine and General Purpose Pump.

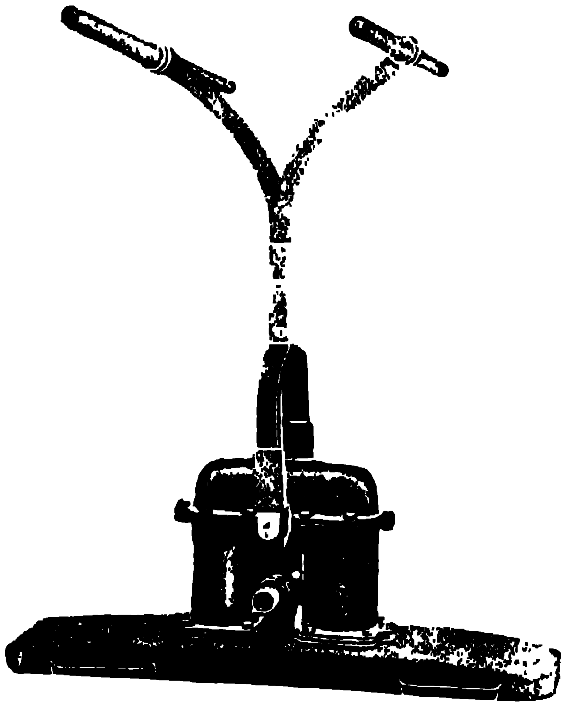
Particulars and Prices.

Bore of Working Barrels.	Max. Height of Discharge.	Discharge* per Hour.	Diameter of Suction.	Diameter of Delivery.	**Price of Pump without Hose.**	**Foot Valve. Each.**
Inches.	Feet.	Gallons.	Inches.	Inches.	**Rs.**	**Rs.**
5	60	3,000	2½	2½	**520**	**12**
	70	4,350	2½	2½	**650**	**12**

*** See Note in Introduction.**

Gun-Metal Portable Ship's and Fire Engine Pump.

Mounted on Wood Block.



This is the well-known Portable Double Barrel Ship or Fire Engine Pump largely used for marine purposes as a Bilge Pump, for deck washing and for fire purposes. We have also supplied large numbers of this pattern for use on tea estates. The design will be found very suitable for the irrigation of garden plots from tanks or wells of moderate depths. The Pump is mounted on a wood block and can be carried and worked by two men

The Pump body and internal parts are made entirely of gun metal. It is therefore suitable for pumping liquids which would have a deleterious effect on an iron pump and it will not rust when laid aside for a season. It is fitted with strong wrought-iron levers and wooden handles.

Capacities and Lifts when worked by four men.

Size of Pump.	Capacities and Lifts	
4" Pump.	1,500 gallons per hour at 24 ft. Lift.	Maximum capacity and height water can be raised.
5" ,,	2,400 ,, ,, ,, ,, 15 ,, ,,	
4" Pump.	480 gallons per hour at 75 ft. Lift.	Reduced capacity at maximum height of pumping water.
5" ,,	600 ,, ,, ,, ,, 60 ,, ,,	

Particulars and Prices.

Diameter of Barrel.	Diameter of Suction.	Diameter of Delivery.	Price.	Extra fitted with half Couplings for Hose.
Ins.	Ins.	Ins.	Rs.	Rs.
4	2	1½	420	20
5	2½	2	480	25

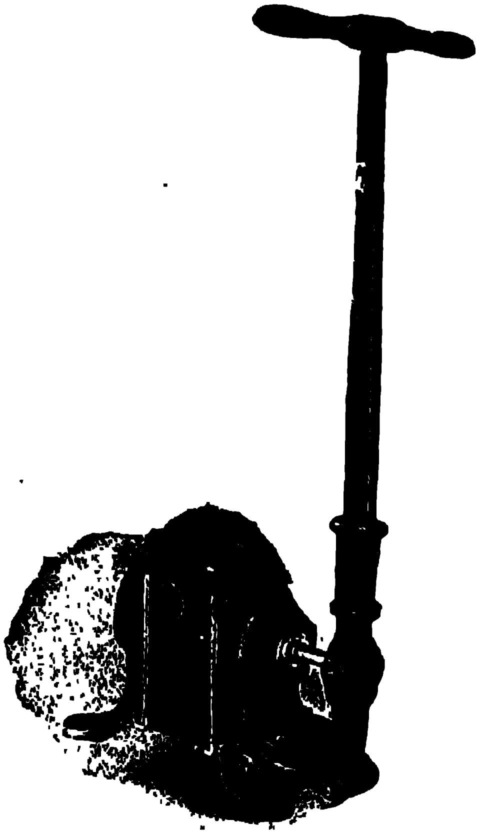


Fig. 470.

The "Challenge" Force Pump.

The "Challenge" Double-Acting Force Pump is designed for use in mills and warehouses, on jetties and aboard ships as Deck Pumps.

The Cylinder is lined with brass. The Piston Rod is brass cased and operates through a brass packing gland. The Valves and Valve Seats are of brass. The discharge is located above the suction, thus making it impossible for air pockets to form

The Suction and Delivery Branches are screwed to take 2 inches gas pipe but couplings for Hose can be supplied at extra cost. The Pump is usually connected to 1½ inches Suction and 1½ inches Delivery Hose.

On ships this Pump performs the three fold purpose of filling Boilers when cold, washing down decks, and satisfies Government inspection as to fire protection

Particulars and Prices.

Size No.	Dia. of Cylinder	Stroke.	Approx. Capacity per Stroke.	Dia. of Suction.	Dia. of Discharge.	Price.	Foot Valve 1½"
8	4"	4½"	½ gallon	2"	2"	**Rs. 180**	**Rs. 9**

Gould's "Columbia" Double-Cylinder Force Pump.

The "Columbia" is adapted for a large variety of uses on shipboard, about wharves, factories and residences.

The Pump comprises two brass lined cylinders with leather packed plungers, which contain brass puppet valves The suction valves are of leather The plungers, operated alternately by the long malleable lever, produce the same effect as a Double-Acting Pump. The lever can be placed on the shaft in four different positions

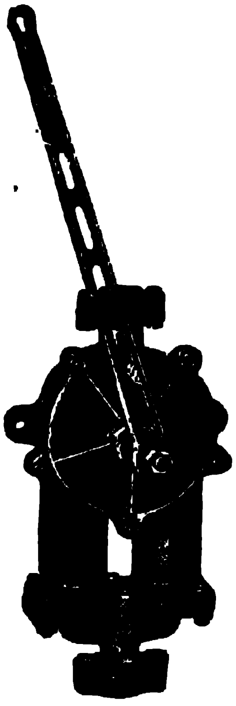


Fig. 1440.

Size No.	Dia. of Cylinder.	Stroke.	Suction and Dis-charge.	Imperial Gallon per hour (Maxi-mum).	Lift and Force
	3½"	5"	1½"	900	100 feet.

Fig. 1440. Pump is as described above with strong lugs cast on each side of the case for the purpose of securing to wall, post or plank .. .. .. **Rs. 125**

Fig 1524. The same as Fig. 1440 but fitted with a base as shown for bolting to a bracket or stand .. **Rs. 140**

Fig. 1566. The Pump, as illustrated in figure 1524, can also be fitted with an air vessel, at extra charge.

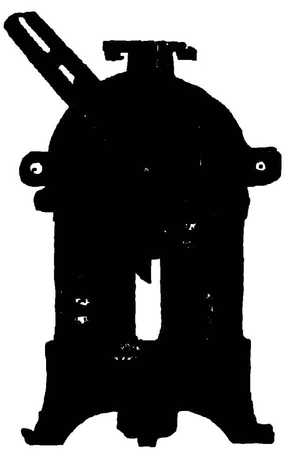


Fig. 1524 (Sectional).

Hand Rotary Force Pump.

Fig. 297½.

This Pump will lift water as far as any Piston Pump and give a **constant uniform discharge.** If an upward delivery is required, the cap above the goose neck, which covers a discharge orifice, can be removed and screwed on the lower end of the neck, thus closing the latter. After working, if the Pump is to stand idle for any time a little clean oil should be poured into the fan chamber, the handle being afterwards turned round once or twice.

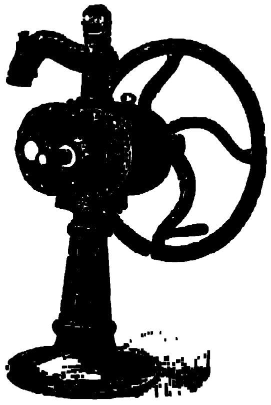


Fig. 297½.

Particulars and Prices.

No.	Capacity per minute 50 Revolutions.	Diameter of Suction.	Diameter of Discharge.	Lift and Force.	Price.	Foot Valves. Each.
	Galls.	Ins.	Ins.	Feet.	Rs.	Rs.
2	6	1¼	1	30	115	7
3	8	1½	1¼	18	125	8
4	13	1½	1½	11	225	8
5	18	2	2	8	260	9

This type of pump should not be more than 15 feet above level of water to be pumped preferably less.

Double-Acting House Force Pump.

Fig. 1242.

An inexpensive type of flywheel and bucket pump. The cock in spout permits discharge to be made from top of air chamber to tank above or wherever desired. Valves of a new and improved design are all grouped in valve box in front and easy of access; plugs are provided for emptying Pump of water when required. With a short stroke, this Pump obtains the same results as from a long stroke Lever Pump operated in the usual manner.

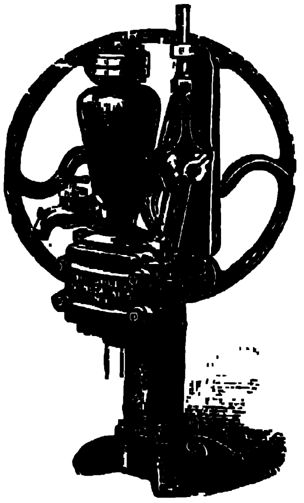


Fig. 1242.

Particulars and Prices.

No.	Revolutions per Gallon.	Diameter of Cylinder.	Stroke.	Diameter of Suction.	Diameter of Discharge.	*Lift and Force.	Price.	Foot Valve. Each.
		Ins.	Ins.	Ins.	Ins.	Feet.	Rs.	Rs.
4	7	3	2½	1½	1¼ pipe 1 hose.	60	275	8

* Total Lift and Force from water to point of delivery. Pump not more than 22 feet above water.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

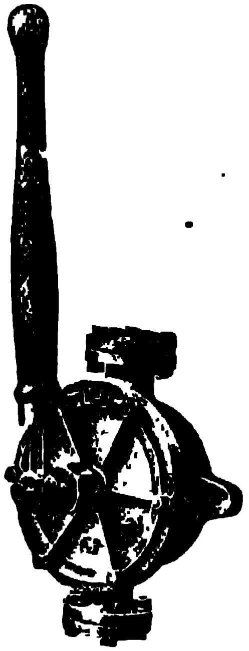
JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Semi-Rotary Pumps.

Double and Quadruple-Acting.

The Semi-Rotary Pump is a simple and compact type, easily worked by Indian labour and specially suitable for pumping water into house service tanks for domestic supplies. The pumps are tested for vacuum and pressure before leaving the makers' works. The handle can be fixed in any convenient position. We have supplied large numbers of these pumps for pumping oil into storage tanks. Semi-Rotary Pumps are regularly fitted to oil wagons on Indian Railways.



We stock the following types:—

Fig. 200. Double-Acting with C.-I. Body with Brass Valves and Spindle Bearings and Steel Spindle.

Fig. 202. Double-Acting; All-Brass.

Fig. 203. Quadruple-Acting, C.-I. Body, Brass Valves and Clack Valves in the body instead of on the Pump Wings.

The Semi-Rotary Pump Bodies are bored and faced and the valves and working parts machined by special tools. The cover makes a joint with the moving parts in a special manner and ensures the satisfactory working of the Pump.

Note.—Where a Pump is only in occasional use for water, an All-Brass Pump is recommended. Where there is a greater suction than 4 feet, a combined Holding-up Valve and Strainer should be used.

Particulars and Prices.

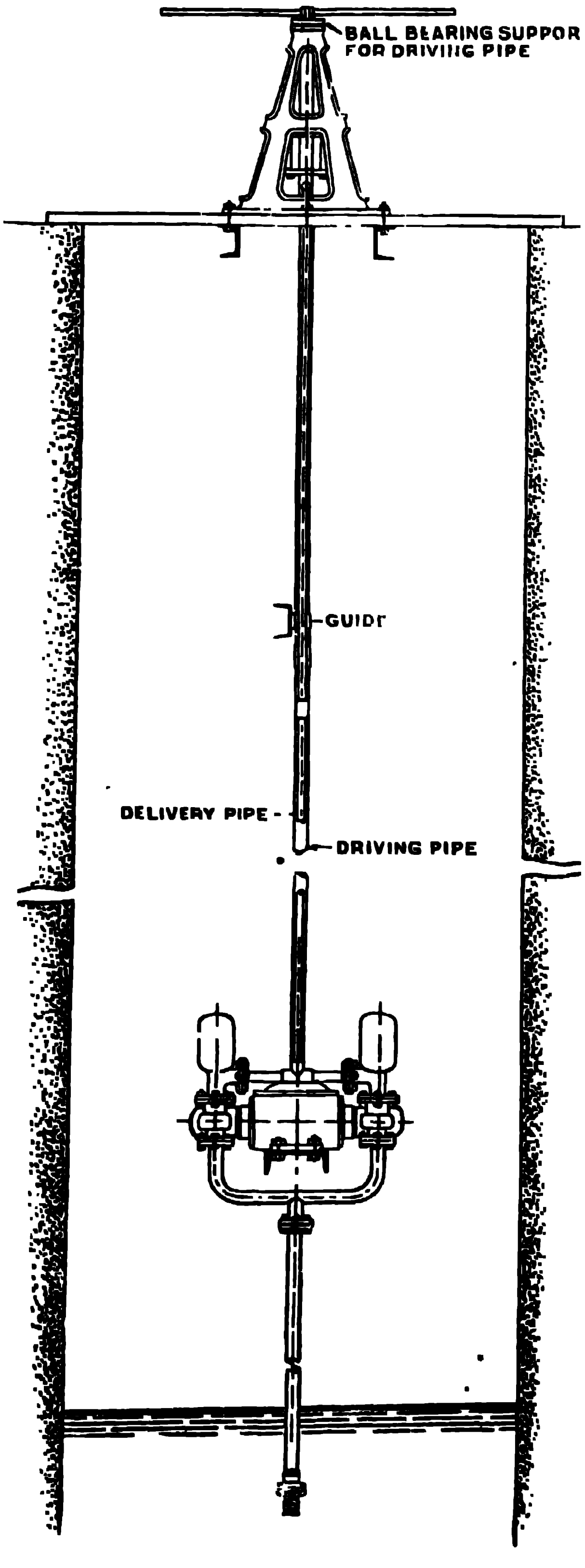
Size No.	1	2	3	4	5	6	7	8	10
Dia. of Suction & Delivery Pipes, ins.	¾	1	1¼	1¼	1½	1½	2	2	3
Gallons per hour, Double-Acting	420	450	570	870	960	1,320	1,560	2,310	3,500
Price, each. Fig. 200 Rs.	26	32	38	47	52	60	80	100	200
Price, each. Fig. 202 Rs.	32	45	60	72	90	105	145	200	320
Gallons per hour, Quadruple-Acting	490	620	930	1,220	1,400	1,710	2,110	2,640	4,800
Price, each. Fig. 203 Rs.	32	40	48	64	72	90	110	145	250

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Phoenix Double Plunger Deep Well Pump for Hand or Power.



This pump has been designed to meet the demand for a reliable and efficient deep well pump capable of being satisfactorily worked in wells up to 80 feet in depth and against heads up to 120 feet. Owing to the simplicity of construction and the small number of wearing parts it is specially suitable for municipalities and out-stations where continuous service is required and repairs are difficult to carry out.

The power applied to the handle on the head frame is transmitted directly to the pump through a driving pipe. This method of transmission obviates the use of rods which require more supports, need careful lining up and add to friction losses.

The driving pipe is carried on a ball race at the top of the head frame which reduces the friction and inertia losses to a minimum.

When employed as a hand pump a handle is fitted as shewn and the stroke is limited to 9" so that only the most effective part of the pump stroke is employed. There is thus no period when the handle is in motion and no water is being pumped.

For power purposes a pulley replaces the handle and the stop is removed so that a rotary motion can be given direct by belt from an oil engine or other source of power

Specification.

The plungers are of cast-iron and work in renewable gun-metal liners. The suction and delivery valves and seats are of gun-metal and are arranged one above the other for easy access. The driving pipe is flexibly connected at both extremities and the weight is taken on a ball bearing at the top of the head frame. The main bearing in the pump is 6 inches long and is renewable. Air vessels are fitted to each delivery outlet to minimise shock.

HEADS AND CAPACITY.

Total Head in feet.	Hand Power Galls per hour. 2-Men	4-Men	Power Driven Galls. per hour. 60 R. P. M.	to 90 R. P. M.
30	800	. .	1,250	1,850
40	600	. .		
50	470	940		
60	400	800		
80	300	600		
100	240	480		
120	200	400		

Price of Pump and Standard for hand or power. Rs. 700

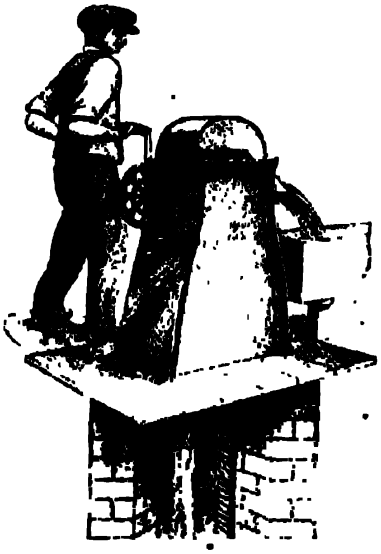
***Add*—For every foot of depth to water level „ 6**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

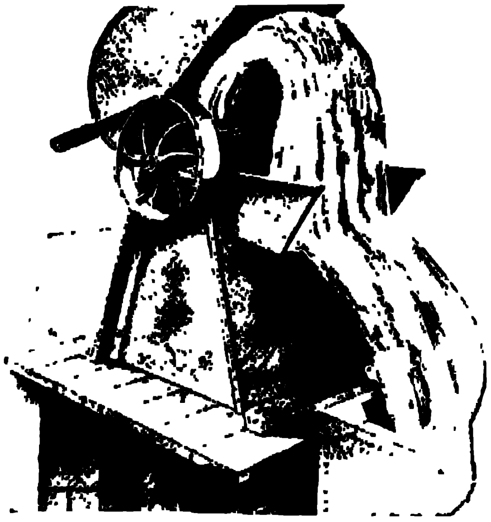
RANGOON, MADRAS,
BOMBAY, LONDON.

Deep Well Pumps



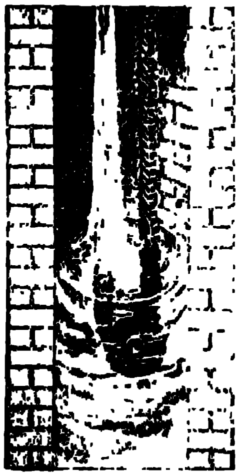
The "Aquatole" (Hand Driven)
Liquid Lifter.

The "Aquatole" Endless Chain Pump.

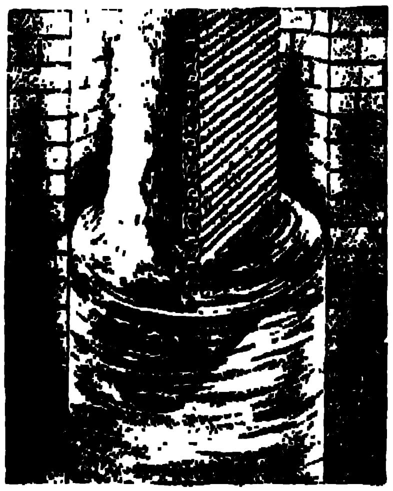


The "Aquatole" (Power Driven)
Liquid Lifter.

As Sole Agents for the "**Aquatole**" Pump, we are able to introduce a new method of raising water or any other liquid or semi-liquid from any depth between wide practical limits, without alteration of design or type, dealing with the smallest quantities up to volumes of many hundreds of tons per hour, with a high general efficiency. The "**Aquatole**" Pump has neither valves nor pipes. It consists of an endless chain of superposed helical coils linked together by horizontal pins. This chain is driven by a smooth-faced, flanged pulley at the top, and carries a free "Jockey" pulley at the bottom for the purpose of keeping the lower ends of the chain apart.



Well Pumping.—By far the greatest demand in India is for pumps to raise water from wells for irrigation purposes. For this the Aquatole Water Lift is particularly suitable as it requires no fixing of supports or guides below ground level, has no working parts in an inaccessible position and is applicable to very deep wells. All the fixing necessary is at the surface of the well and as no lining up of rods has to be done the most unskilled labour can be used both to fix and work the pumps.



CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD** ENGINEERS RANGOON, MADRAS, BOMBAY, LONDON.

"Aquatole" Endless Chain Pumps.

Type of "Aquatole"	Width of Chain (Approx.)	Capacity Gallons per hour	Approximate B. H. P. required for:—					Diameter of Top Roller.	Revs. per	Prices.	
			20ft. lift	40ft. lift	60ft. lift	80ft. lift	100ft. lift			Pump	Chain per foot of depth.
A 1.	1½″	400 to 800	Hand or Power operated							Rs. 300*	Rs. 4 0
D 2.	2″	1,800		½	¾	1	1¼	5″	400	" 300	" 6 0
F 3.	3″	4,200		1¼	1¾	2¼		5″	400	" 325	" 8 0
H 4.	4″	7,200	2½	3¼	4	4¾	5¾	8″	350	" 415	" 10 0
L 6.	6″	9,900	3	4¼	5½	6½	7¾	8″	350	" 455	" 13 0
P 8	8″	13,200	3¼	5¼	6¾	8¼	9¾	8″	350	" 550	" 16 8
T 12.	12″	20,000		7	9¼	11½	13¾	8″	350	" 615	" 20 8

*Pumps fitted with 2 handles **Rs. 20** extra.

NOTE:—In estimating the power required to drive an "**Aquatole**" Water Lift a suitable margin should be allowed to cover the working conditions appertaining to engines in India and allowance should be made for the drop of water level when pumping from wells When the water lifts are driven by oil engines it is advisable to add about 25 per cent. to the above powers We shall be pleased to advise on each particular case

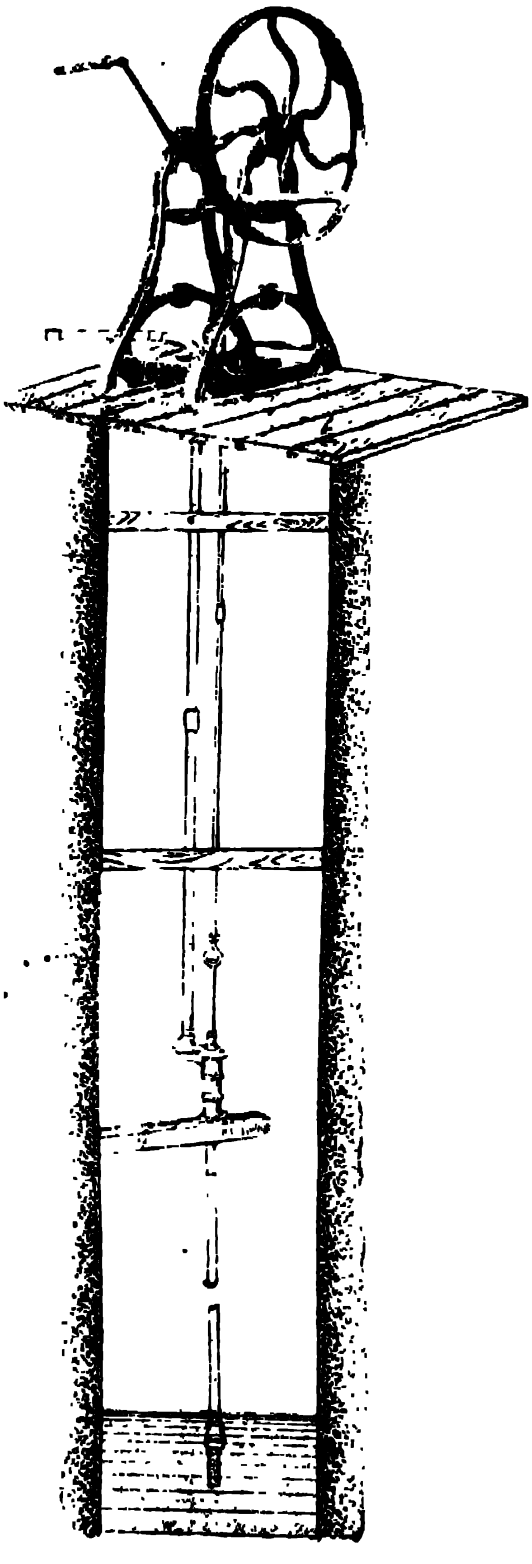
For quantities over 20,000 gallons (say 100 tons) per hour, as many chains as may be required can be mounted; and, on account of the fact that the 12 ins size is the widest that can be conveniently handled, we recommend the adoption of that method, the total output being the exact multiple of the single unit.

Submergence.

The normal submergence of the lower end of the chain is 9 ins. measured from the surface of the water to the centre of the jockey drum. When submerged to any greater depth, increased power is absorbed, although the output of the "**Aquatole**" is not diminished.

It is therefore advisable that where the water level varies to any great extent, spare lengths of chain should be inserted or removed (an operation of but a few minutes), as the case may be; or, if desirable, a special design of headgear can be provided at extra cost to raise or lower the chain by mechanical means.

Single Brass Barrel Pump.



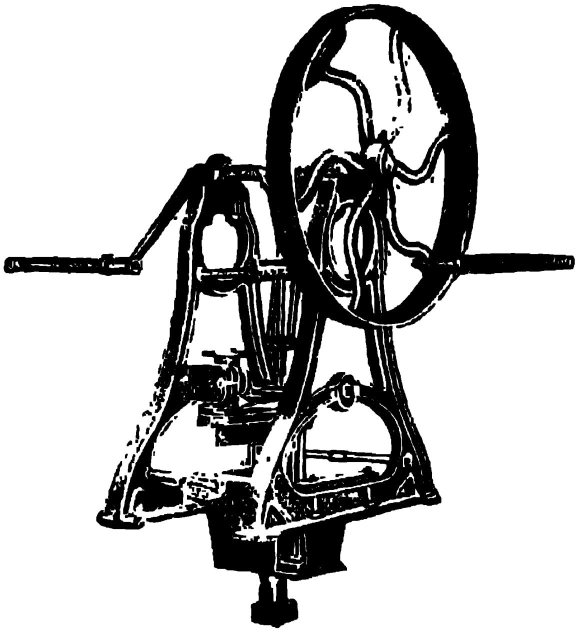


Fig. 220.

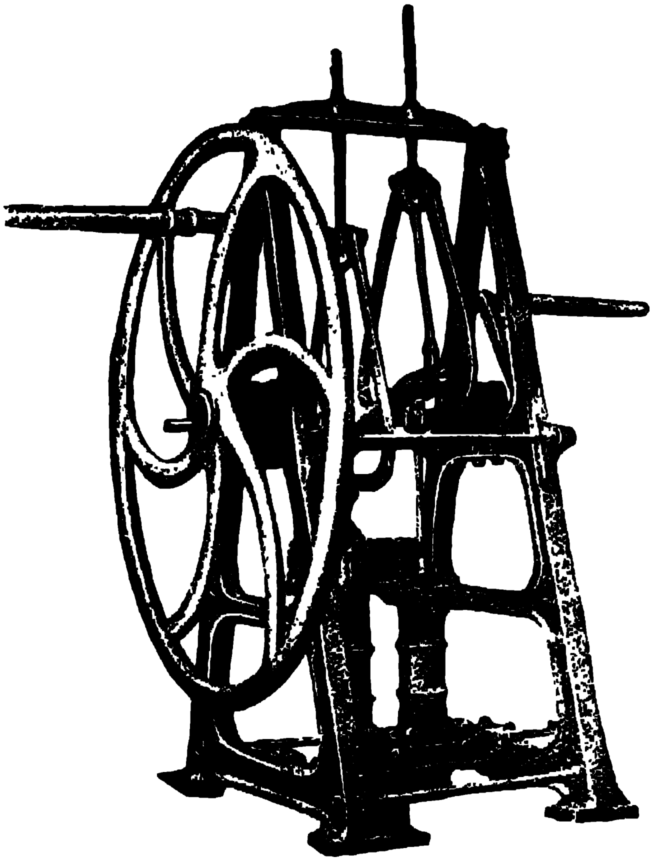
This represents our single Brass Barrel Pump with strong Cast-Iron frame, Wrought-Iron cranks, Gun-metal bearings and substantial balanced fly-wheel and two handles. When required for suction lifts of over 25 feet, the barrel can be disconnected from the frame and fixed to a beam in the well. The power is then transmitted by a rod as shown in the illustration. The pump barrel is 3½ inches diameter, suction and delivery branches being 2 inches diameter. **Where lifts of over 30 feet are required, it is advisable to order a geared pump.** Unless ordered otherwise, a gearing in the ratio 3 to 1 will be supplied.

Prices.

Description.	Gallons per hour.	Prices.
Pump as illustrated in Fig. 220 ..	500	Rs. 440
As a deep well pump with pipes, rods and foot valve for 30 feet deep	500	„ 560
Extra per foot for depths exceeding 30 feet	..	„ 4
Extra for gearing	..	„ 100

NOTE.—Prices do not include supports or guides.

Double Brass Barrel (Kite Motion) Pump.



The Double Brass Barrel Force Pump illustrated above is of our own manufacture. It is fitted in strong cast-iron frames with wrought-iron stretchers and overhead guides. The Pump has doors for access to the valves. It can be easily disconnected from the frame for fixing in wells and can be worked with the same handles and gear.

When so arranged the guides for the rods should be spaced at intervals of about 6 feet.

The prices given are exclusive of beams or timber supports in the well.

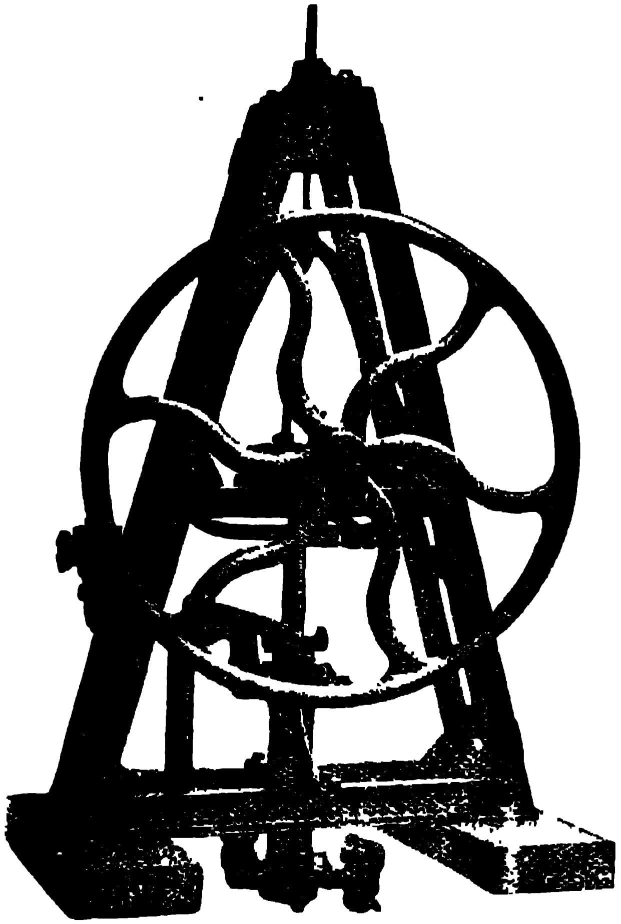
Cheaper Pumps are sometimes offered in place of this with the barrels made of thin brass pipes. When comparing prices the increased life due to the solid cast barrels should be considered.

Particulars and Prices.

Diameter of Barrels.	Maximum Capacity per hour.*	Diameter of Suction and Delivery.	Pump as Illustrated.	Rods and Guides, per 1 ft. depth.	Foot Valve.
Ins.	Galls.	Ins.	Rs.	Rs.	Rs.
3½	1,000	2½	600	6	12

*NOTE.—The maximum capacity can be obtained with two men working the Pump on a total lift not exceeding 15 feet or with four men at 30 feet lift.

Jessop's Improved Double-Acting Hand Pump.



We illustrate a new Double-Acting Pump of our own make which has been **specially designed for heavy wear and use in outstations where repairs are almost impossible.** The following points have had special attention:—

No studs are used in any part of the Pump; bolts which are not liable to breakage are used throughout **The frame** is stiffly built of **steel sections instead of cast-iron** thereby obviating the risk of breakage in transit **The valve boxes, valve seats and covers** on both suction and delivery are similar and **interchangeable. All valves are of brass** and no rubber or leather is used in any part of the pump Glands neck rings and plunger rings are all of brass The stuffing box is designed to take a standard section of square packing The Pumps may be used for all heads and lifts for ordinary or well pumping, and the same Pump can be altered within certain limits to deliver different quantities against different heads. The table of outputs given is the result of careful experiments made in our works We would remark in conclusion that the Pump is not offered as a cheap Pump to compete with others of a somewhat similar type on the market but is meant to suit conditions which demand the best material and workmanship with continuous work without attention or repairs

Size of suction and delivery 2 inches diameter.

This Pump is specially suitable for deep well pumping. Illustrations of its application to wells are shewn on the opposite page

Price for hand power ..	.	**Rs. 600**
„ with fast and loose pulleys and gear drive ..	.. .	**„ 725**
Rods and Pipes	per foot	**„ 4**

Capacities in gallons per hour for various lifts when worked by hand or power.

Total height in feet.	For Hand Power. (Number of men.) One		our.	Worked by Oil Engine. (B.H.P. of Engine.) 2½ B.H.P.	3½ B.H.P.	5½ B.H.P
	150	900	1,800	..	..	
	300	600	1,200	...	.	
40	225	150	900		..	
50	180	360	720	2,400	..	
60	150	300	600	2,000	2,500	
80		225	450	1,500	1,850	
100	.	180	360	1,200	1,500	2,400
120		150	300	1,000	1,250	2,000

Note. Where pumping has to be through a long length of piping allowance must be made for the extra "head" due to friction in pipes. We shall be pleased to advise about this on receipt of particulars

Power Driven Pumps.—These are usually driven through reduction gearing from a countershaft fitted to the pump frame and provided with fast and loose pulleys.

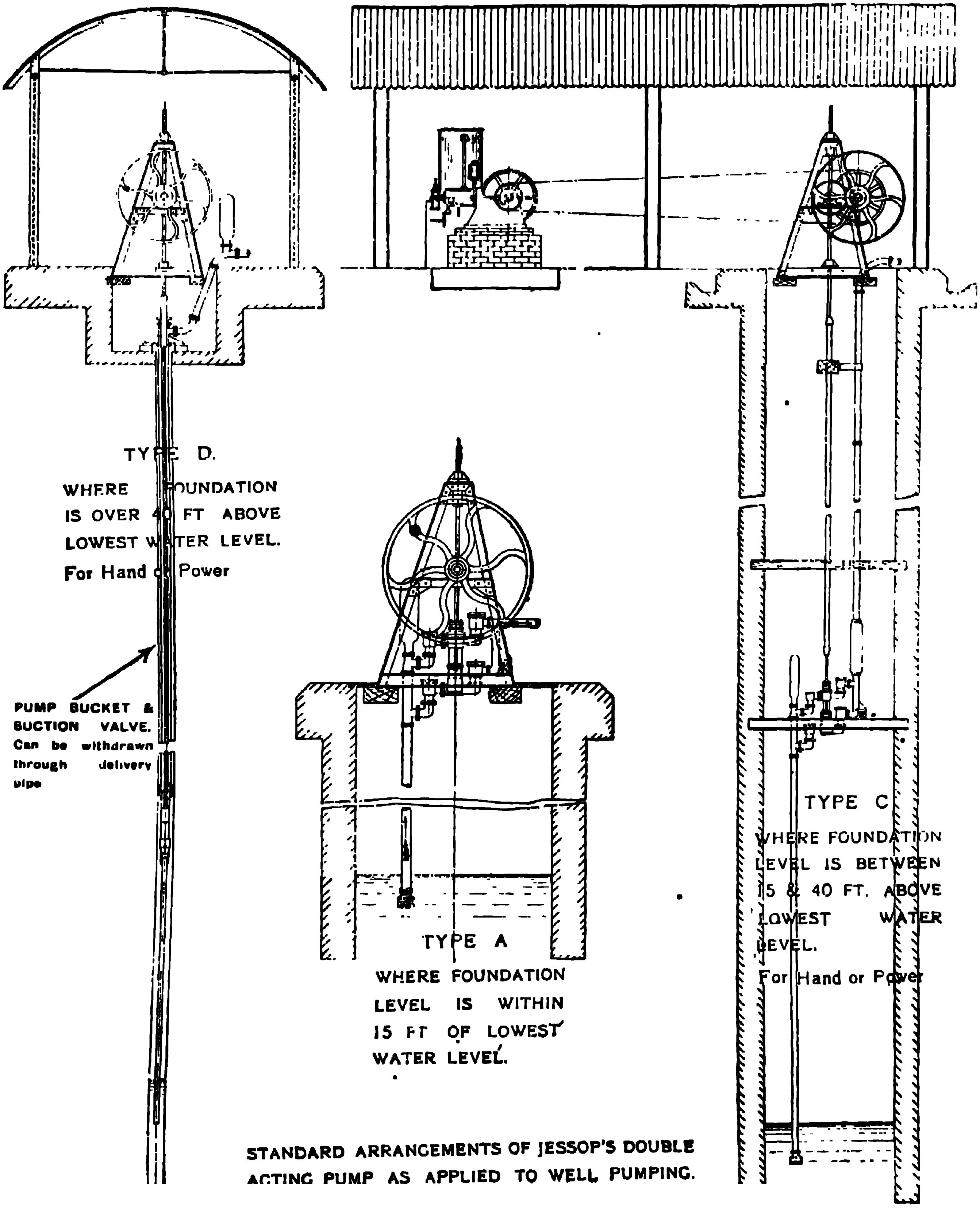
Deep Well Pumps.—For wells in which the water level is more than 40 feet below ground level a special design is recommended with differential plungers.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Jessop's Improved Double-Acting Hand Pump.


TYPE D.
WHERE FOUNDATION IS OVER 40 FT ABOVE LOWEST WATER LEVEL.
For Hand or Power
PUMP BUCKET & SUCTION VALVE. Can be withdrawn through delivery pipe
TYPE A
WHERE FOUNDATION LEVEL IS WITHIN 15 FT OF LOWEST WATER LEVEL.
TYPE C
WHERE FOUNDATION LEVEL IS BETWEEN 15 & 40 FT. ABOVE LOWEST WATER LEVEL.
For Hand or Power

STANDARD ARRANGEMENTS OF JESSOP'S DOUBLE ACTING PUMP AS APPLIED TO WELL PUMPING.

Deepwell Lift and Force Pumps.

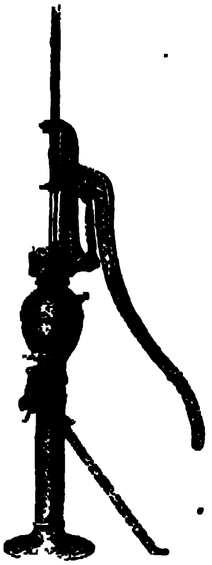


Fig. 1653.

Fig. 1231.

Standard Fig. 237 in working order.

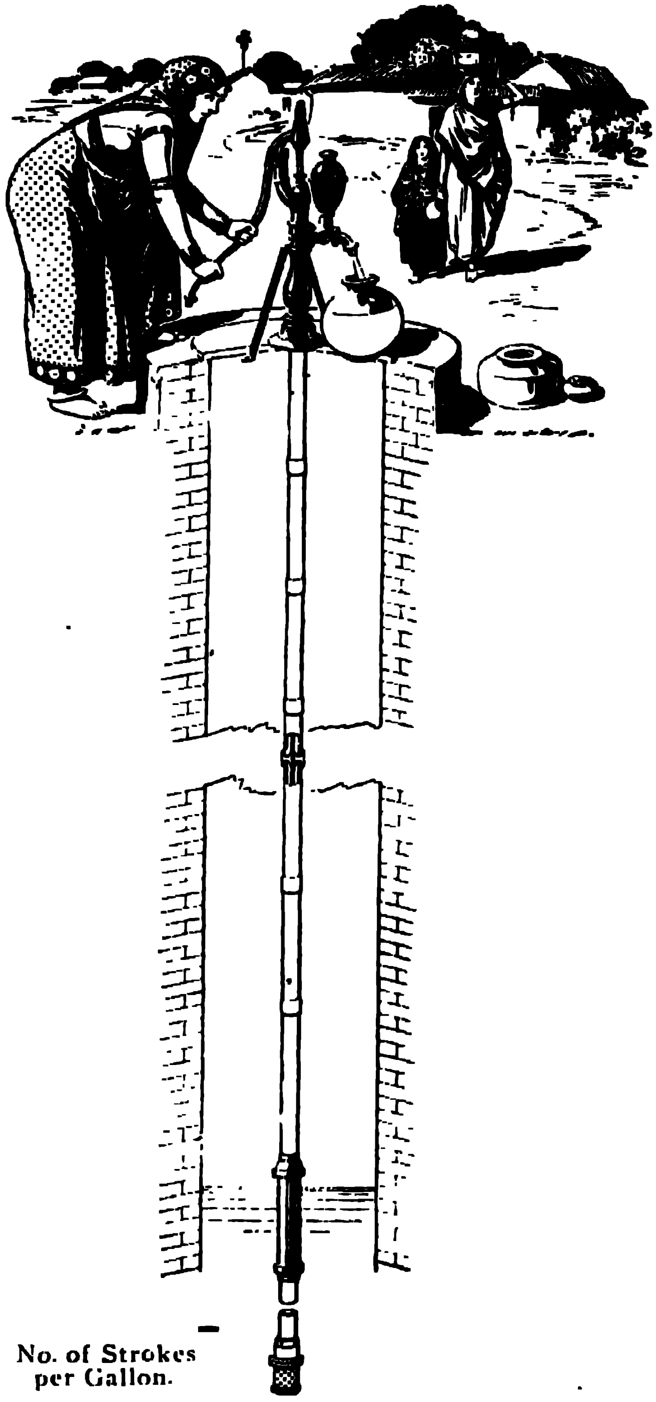


Fig. 1653. Lift and Force Pump Standard, provided with air chamber and adapted for operation by hand or wind mill. An outlet tapped for 1¼" pipe is provided in the back of the stock for discharging to overhead tanks, etc.

The engraving on the right represents a Deepwell Pump fitted to a well and in operation. The mode of working is to fix any of the Standards over the well, and lower the Cylinder or working part of the Pump, fixed at the end of the pipe into the water. The piston is worked by means of an iron rod attached to the lever-handle of the Standard and passing down through the pipe to the Cylinder. Cylinders, as illustrated in Fig. 1231, are supplied with these Pumps. Special pipe couplings, with guides for the rod, should be fixed at intervals of about 8 feet.

Fig. No.	Stroke.	Suction.	Discharge.	No. of Strokes per Gallon.
237	6"	1½"	1¼" pipe or 1" hose	

Standard and Cylinder.	Prices for Various Depths with Rods and Pipes.			
	30 feet.	40 feet.	50 feet.	60 feet.
Rs. 115	Rs. 220	Rs. 250	Rs. 300	Rs. 320

Prices include 10 feet of Suction Pipe.

House Force Pump.
Figs. 1408-9.

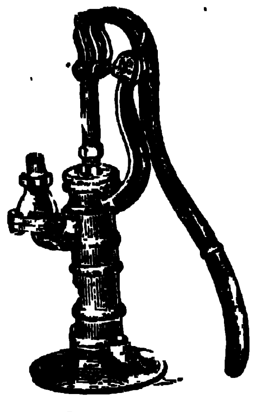


Fig. 1408.

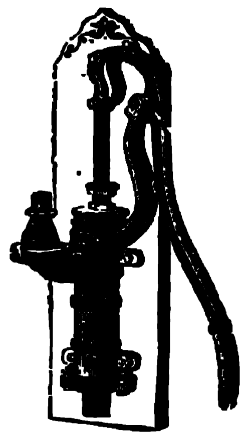


Fig. 1409.

The House Force Pump of the type illustrated is a substantially made and well finished article. It is fitted with a brass plunger rod and brass glands. The parts are few, simple and accessible. This type of Pump is popular for tube-wells, house service supply and ships' work. The Pump may be used for raising water a total height of 50 to 75 feet.

The Cistern Pump is similar to the above but delivers water from a spout.

Particulars and Prices.

Size No.	Cylinder.	Suction Diameter.	No. of Strokes per Gallon of Water.	Price. Fig. 1408 All Iron.	Price. Fig. 1409.	Foot Valves. Each.
	Ins.	Ins		Rs.	Rs.	Rs.
2	2½	1¼	10	52	60	7
4	3	1¼	8	65		7
6	3½	1½	4	95		8
8	4½	2	3	105		9

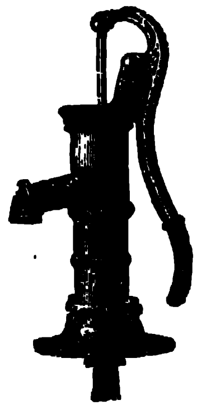


Fig. 1580.

Cistern Suction Pumps. Fig. 1580.

Size No.	Dia. Cylinder.	Suction.	No of Strokes per Gallon of Water.	Price.
	Ins.	Ins		Rs.
	3	1¼		28
	3½	1½		40

Pitcher Spout Pumps. Fig. 205½.

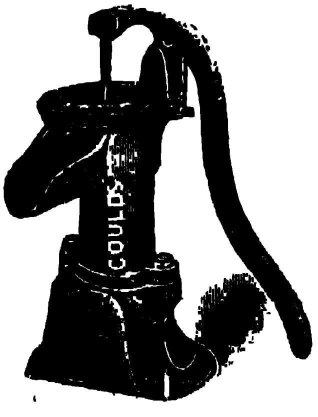


Fig. 205½.

The Pitcher Spout Pump supplies the demand for a low priced but substantial Pump for use over cisterns and shallow wells. The bearer top is secured to the cylinder with a set screw. A nut tapped for iron pipe is supplied on the threaded hub beneath the "G" base.

Size No.	Cylinder. Dia. Ins.	Suction. Ins.	Stroke. Ins	No. of Strokes per Gallon.	Price, with Leather Buckets.			Price, with Solid Rubber Valves.		
					Rs.	A.	P.	Rs.	A.	P.
	3½	1¼		6	20	0	0	20	0	0
	4	1½		4½	22	0	0	24	0	0

NOTE.—Pumps of the type described under Figures 200 and 205½ are only suitable for lifting water from depths not exceeding 25 feet. Pumps of different design can be offered for greater depths or where required to force the water through a pipe to some place above or beyond the Pump.

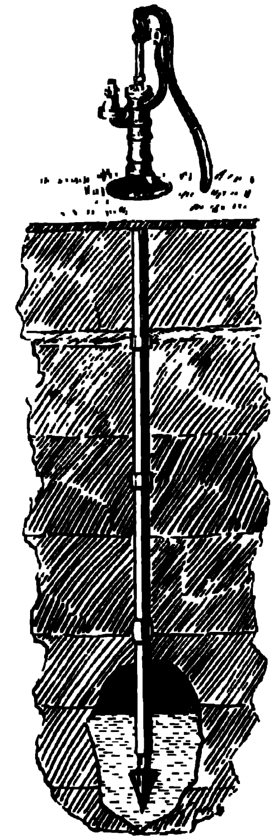
CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

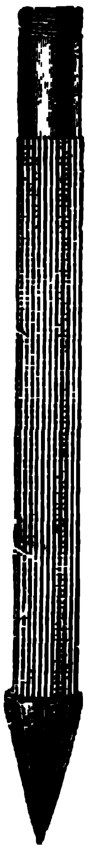
RANGOON, MADRAS, BOMBAY, LONDON.

"Abyssinian" Tube-Wells

And Accessories for Same.



This system of raising water offers every advantage of rapidity and economy in obtaining unfailing supplies for domestic use, irrigation, manufacturing and other purposes, thereby enabling operations to be carried on where hitherto the want of water proved a fatal barrier.



General Description.

Wrought-Iron Tubes (the first being a steel filter-point drilled with holes and wrapped with gauze) are driven in earth by means of an annular weight, falling upon a clamp which grips the tube near the ground, the pipe itself forming the guide. The driving weight is raised by pulleys attached to a tripod, and allowed to fall on the clamp until the Tube penetrates the earth, and the clamp reaches the ground. The clamp is then shifted, and the process repeated until the whole length is driven. Fresh tubes are connected and driven in this manner until water is reached, when the pump is screwed on to the tube and after a short pumping clear water is obtained.

Prices of Tube-Well Sets.

The regular Tube-Well Set comprises a Pump, 2-5 ft. and 1-10 ft. length of Tube-Well Pipes and one Filter Point. Driving Gear Sets consist of a strong W.-I. Tripod; one C.-I. weight, one pair C.-I. Clamps with Bolts and Nuts; two double-ended Spanners; one set of Gauge rods; two pairs Gas Tongs and one bundle rope. Extra lengths of pipe can be supplied when the water strata is below 30 feet.

Nine Combinations are offered as follows.

Dia. of Tube-Well		1¼"				1½"			
Set No	1	2	3	3A	4	5	6	7	8
Type of Pump	No. 4 Fig. 205½ Pitcher Spout Pump.	No. 4 Fig 200 Cistern Suction Pump.	No. 2 Fig 1408 House Force Pump	No. 4 Fig 1408 House Force Pump.	No. 4 Fig. 205½ Pitcher Spout Pump.	No. 6 Fig 200 Cistern Suction Pump.	No. 6 Fig. 1408 House Force Pump.	No. 8 Fig. 200 Cistern Suction Pump.	No. 8 Fig. 1408 House Force Pump.
For 20 ft depth	Rs 70	Rs. 73	Rs. 87	Rs. 94	Rs. 78	Rs. 90	Rs. 137	Rs. 127	Rs. 180
For 25 ft depth	Rs. 77	Rs. 80	Rs 96	Rs. 101	Rs. 85	Rs. 96	Rs. 144	Rs. 141	Rs. 194
For 30 ft. depth	Rs. 83	Rs 86	Rs 100	Rs 107	Rs 92	Rs. 105	Rs. 150	Rs. 155	Rs. 208

Superior Steel Filter Driving Points.

The driving points are made from Galvanized Pipe, at the end of which is fitted the steel point. The pipe is drilled with $\frac{1}{16}$ in. holes, and covered with very fine brass wire gauge, while over this is placed a perforated Brass Socket for protection.

		1¼	1½	
Price	Rs.	20	23	32

Special quotations for orders of 12 or more.

Notes on Driving Tube-Wells.

1. **The Filter-Point or Pioneer-Tube,** in its simplest form, is a perforated steel tube about 2½ feet long with a sharp steel point, and perforated with holes varying from ⅛ inch to ¼ inch, extending from 15 inches to 3 feet upwards from the point. Fig. 524. The enlargement of the point serves to clear a passage for the sockets by which the tubes are screwed together. When the soil is of a sandy nature, the perforations in the tube allow sand to enter with the water, thus causing rapid destruction of certain parts of the pump through friction; to prevent the entrance of any but extremely minute particles of sand, the perforated steel point is provided with a sand filter, which consists of a layer of very fine brass gauze which is tightly wound round the tube where it is perforated.

2. **The tubes** which are screwed on to the point should be specially tough lap-welded tubes in order to stand the hammering and vibration to which they are subjected. **When Tube-Wells were first introduced, it was assumed that any kind of common gas or other pipe would answer the purpose, but experience has shown that inferior tubing is very apt to crack during driving.** The tubing used may vary in length; pieces of 6 to 8 feet are, as a rule, the most useful size, unless there be data for assuming that water will not be reached at moderate depths below the surface.

3. **The Driving Gear.**—On to the pipe a clamp is fastened by two bolts at about 3 feet from the point; the clamp is of cast-iron and screwed internally, so as to form teeth to grip the tube. Next the cast-iron driving weight is slipped on the tube above the clamp. The tube thus furnished is stood up perfectly vertical in the centre of the tripod and through the central opening at the top of the tripod a length of tube is introduced and screwed on to the end of the pipe. The whole being now arranged in position, the ropes are made fast to the weight and passed over the pulleys of the tripod, and driving is commenced by two men pulling the ropes which are attached to the driving weight, and then suddenly releasing their hold, and thus allowing the weight to fall on the clamp. Care must be taken, as the driving proceeds to frequently tighten equally both the bolts attached to the clamp to prevent it from slipping. When the clamp reaches the level of the earth, the driving weight should be raised and kept suspended while the clamp is moved about 18 inches up the tube If the ground be very soft, the clamp can be raised 2 feet at a time, as this saves frequent re-adjustment; but if the ground be very hard, not more than one foot. In this manner driving is continued until the top of the tube comes some distance below the hole in the tripod head, when a fresh length of tube is screwed on to the socket joint In screwing together the tubes, the ends must meet or butt against each other, and the joint must be made perfectly tight, so that it cannot unscrew in the course of driving. Length after length is in this manner added until the desired depth is reached.

After ten feet or so of tube has been driven an iron plumb should be lowered into it to ascertain whether water has been reached or not. The tube should be plumbed frequently during driving, otherwise by neglecting this precaution a seam of water may be passed.

Driving Gear.

Size	Ins.	1¼		1½		2		Size ..	Ins.	1¼		1½		2	
		Rs.	A	Rs.	A.	Rs.	A			Rs.	A.	Rs.	A.	Rs.	A.
Tripod – ..	each	71	0	72	0	74	0	3 Gauge Rods .	set	4	0	4	0	4	0
C.-I Weight – ..	,,	15	0	18	0	21	0	2 pairs Gas Tongs ..	pair	10	0	12	0	15	0
,, Clamps – ..	pair	19	0	22	0	24	0	Bundle Rope ..		5	0	5	0	5	0
Clamp Bolt	per set	6	0	7	0	7	0	Complete Sets ..		130	0	190	0	150	0

4 **Pump.**—When water is struck and stands several feet in the tube, the pump can be applied. To start the pump some water is poured in to prime it and when the air has been driven out, in all ordinary cases, water will follow. At first the water pumped out will be muddy or contain sand, more or less, according to the nature of the soil. After pumping for a short time, and the water shows signs of clearing, the handle of the pump should be raised high for a second or two; by doing this, the bucket will press on to the spur of the clack valve, and cause it to open, and simultaneously the tumbler valve in the bucket will be raised, upon which the water will run suddenly down the tube, which a few strokes of the pump will recover; and this should be repeated several times. The result of the sudden letting down the water several times and stopping it before it has reached the water level of the well, causes the water to force its way violently in and out of the perforations on the sides of the Pioneer-Tube, disturbing the mud and fine particles of the stratum of earth round the perforations. If these operations have been properly performed, the water on pumping will again be as muddy and thick as at first, but steady pumping will in a short time bring up all the mud and fine particles which have been disturbed. The object of this stirring up of the mud is to thoroughly disintegrate the soil and clear away all the finer particles, in the immediate vicinity of the perforations, leaving the larger stones and grit to form a natural filter around the perforated Filter-point. The careful carrying out of this process cannot be too strongly insisted upon, and it must be repeated until mud ceases to come up, for upon the careful carrying out of this greatly depends the quantity of water which the well will yield and the ease with which it can be pumped, while its neglect will in many soils cause sand to come up some time after the well has been made, and will diminish the yield, and also the ease of pumping. Moreover, in some strata, if this be not properly done when the well is first made, the sand will accumulate in the tube, tend to stop the supply altogether, and destroy the pump.

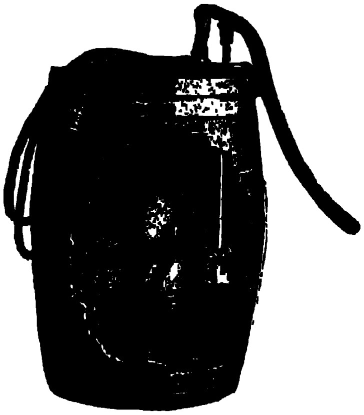
When first starting to pump a well in the manner above described, should the sand accumulate so fast as to prevent the pump from raising water, "**clearing-out tubes**" must be employed in order to pump up all sand out of the tube, and when this has been done, the pump can be again screwed on to the Tube-Well, when in most cases it will be able to pump up the rest, until the well has been cleared.

The "**clearing-out tubes**" are usually of ½ inch internal diameter, and are provided in lengths to suit any depth. A sufficient number to reach the earth in the Tube-Well must be screwed together, and each should be lowered into the well all but about six inches, and sustained in this position by a clamp or tongs, while another length is screwed on. When the accumulation in the well-tube is of a loose sandy nature it can best be withdrawn by means of the pump, which can be coupled on to the "**clearing-out tube.**"

The Tube-Well, as ordinarily used, is not intended for piercing rock or solid stone formations, but it is quite capable of penetrating very hard and compact soils, and can also be successfully driven through chalk. When solid masses of rock or stone are reached, special means of drilling have to be employed. Under ordinary conditions, when coming on rock or stone, the best plan is to pull up the tube and try in another spot. This also applies when deep beds of clay are driven into, for by going a little distance off and driving again in many cases water may be found.

Gould's Barrel Type Sprayer for Tea.

Fig. 1188.



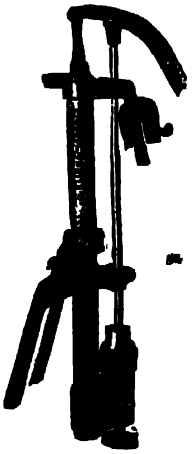
There is a large demand for a high-grade barrel sprayer. To meet this demand, the "Fruitall" sprayer was developed, and is now largely used on Indian Tea Estates.

The Sprayer is extremely simple in design, and light in weight. It is in every respect a thoroughly serviceable and reliable sprayer. It will supply two leads of hose and two nozzles. All working parts, including plunger, gland, valves, valve seats and strainer, are of bronze. The air chamber is large. The lever is long, making it easy to operate the pump and produce high pressure. The plunger is packed from the outside, so it is not necessary to take the entire pump apart to repack it.

The agitator is very simple but effective, and is operated by the pump lever.

The pump is fitted for mounting on the end of the **barrel only**, where it is held in place by an adjustable clamp which fits over the end of stave. It is also anchored to the bottom of the barrel.

Prices.



Outfit C.—2½ inches Spray Pump with air vessel and brass strainer for Iron Suction Pipe. One 15 ft. lead of ⅜ inch Discharge Hose, and one "Mistry Junior" Nozzle .. .. **Rs. 86**

Outfit D.—The same as outfit C, but with two 15 ft. leads of ⅜ inch Discharge Hose and two Nozzles .. .. **Rs. 110**

If with two 20 ft. leads .. .. „ **125**

Extra ½ inch Discharge Hose **Rs. 1-4** per foot.

Note.—No barrel is included in the above prices but the Spray Pump can be supplied complete with barrel or with barrel fixed on a light portable two-wheeled carriage for hand draught at an extra charge.

Nozzles and Fittings.

The "Mistry Junior" Nozzle.

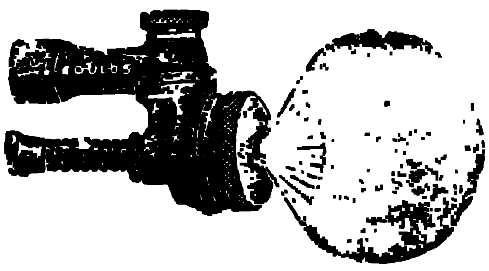


Fig. 1432.

Made of brass with hardened steel disc placed in discharge cap, which can be removed and new one inserted. It has been tested under all conditions and found to give entire satisfaction, producing a perfect mist and covering a wide area. Two steel discs are furnished with each nozzle, one for coarse and one for fine spray. The nozzle is not made with a degorger, as it never clogs. It is convenient to handle as there are no extensions to catch in the trees. It will do the work of two ordinary nozzles.

Fig. 1432. **"Mistry" Nozzle,** superior to all others:—made of bronze with hardened tool steel discs. It has swivel adjustment in order that Spray may be directed in any desired angle .. .. **Rs. 7-8**

Fig. 55. **"Vermorel' Nozzle.** We can supply this when ordered. The "Mistry," however, is an improved form of "Vermorel' Nozzle .. .. **Rs. 7-0**

Union.

Fig. 67. One end cut ¼ inch pipe thread to fit Spray nozzles, and the other end is turned to wire into ½ inch hose or ⅜ inch, if so ordered .. .. **Rs. 1-8**

Y. Connecting Piece.

Fig. 1074½. Designed so that two nozzles can be used with one lead of hose; tapped to fit ¼ inch pipe at butt, which also adapts it to fit. Fig. 67. Coupling for hose .. .. Rs. 3-0

The Knapsack Sprayer.

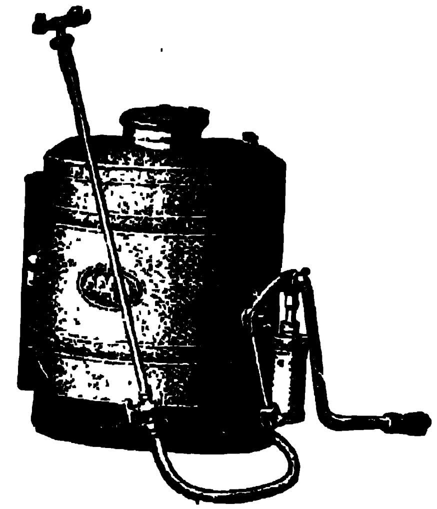


Fig. S1.
Food Production Dept. Type.

The "Ubel" Sprayer Machine which we illustrate is made by the largest British manufacturers of Sprayers and Limewashing Machines, and for quality and reliability is superior to any other type in the market.

Special Features.

Sheet copper container of 3½ gallons capacity, well finished and polished.

All working parts are external.
Pump entirely of brass
Fitted with brass ball-valves.
Weighing 14¾ lbs. **Price, Rs. 65-0.**

The Holder Harriden Pneumatic Knapsack and Shoulder Sprayers.

The Holder Harriden Sprayer S42 is fitted with a powerful air pump for charging container with compressed air. Complete also with pressure gauge, rubber hose, brass spraying arms and swivel self-clearing nozzle. Small one-gallon size has only one shoulder strap.

Container, capacity		1¼	ga		
Spraying,		1		Rs.	**65-0**
Container,		2½			
Spraying,		2			**80-0**
Container,	,,	4	,,		
Spraying,	,,	3	,,	,,	**90-0**

We usually stock the largest size of Holder Harriden Sprayer.

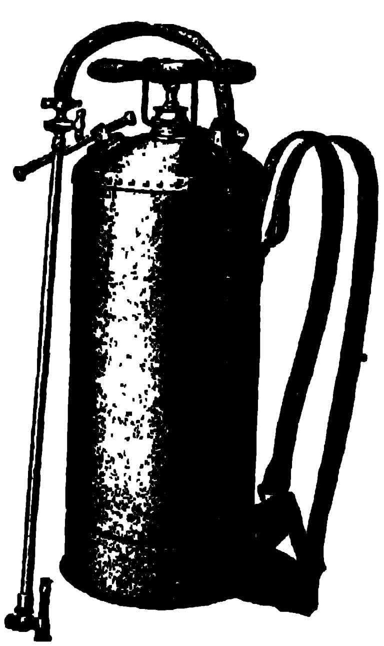


Fig. S42.

Gould's Portable Brass Sprayer.

For Spraying, Sprinkling, Washing Wagons, Windows, etc., and Whitewashing.

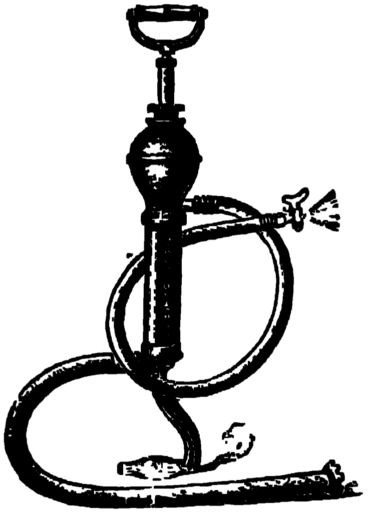


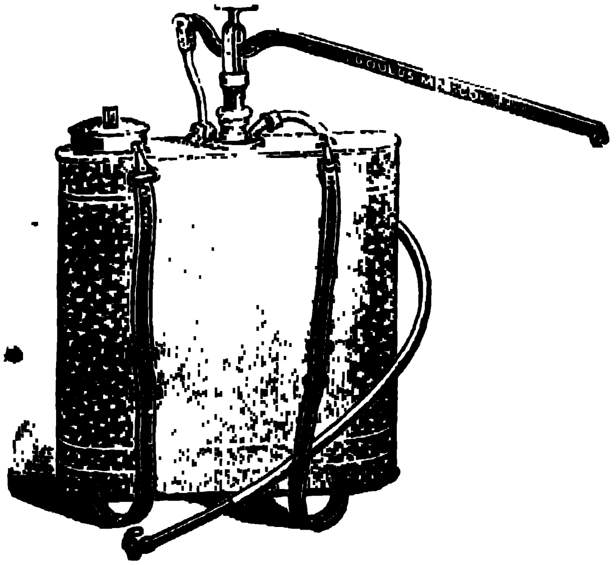
Fig. 561½.

Fig. 561½. "Premier" Sprayer is used with a pail or bucket. It is light in weight but strong, durable and easily operated. Cylinder, plunger, plunger rod and gland are all brass. The nozzle is our well known "Seneca"—one of the best. Nothing better for washing windows, wagons, etc., spraying and sprinkling in small gardens and whitewashing fences, stables, greenhouses, glasses, etc.

Price with 2½ feet of ¾ inch Suction, and 3 feet of ⅜ inch Discharge Hose, Spray Nozzle and Strainer **Rs. 38**

Combination Knapsack Sprayer.

Fig. 1564.

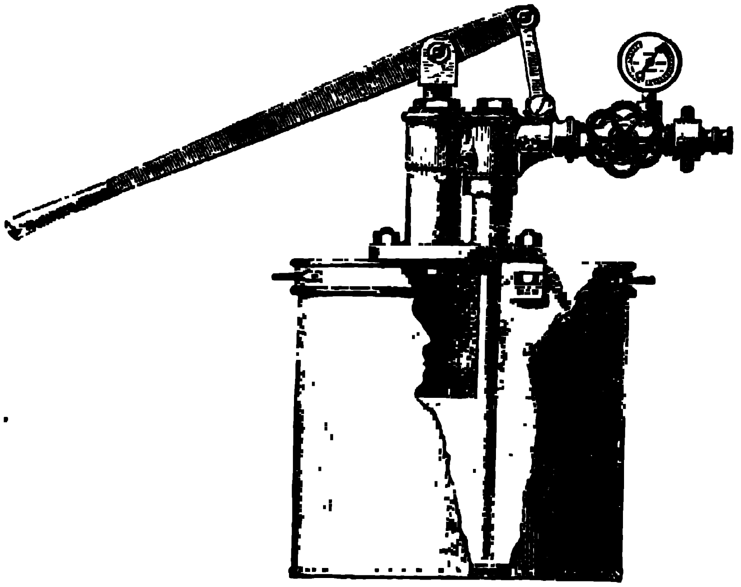


This is a small brass Pump with wing guided brass valves and seats ground to fit, and a long lever that can be readily changed for right or left hand, mounted in a galvanized iron tank holding about 5 gallons and provided with shoulder straps. The filling collar is fitted with a removable wire gauze strainer and tight fitting cover. Four feet of discharge hose with the famous large "Mistry" Nozzle completes a very desirable outfit for use in greenhouses or on hill sides where the use of other types of sprayers are impracticable. It can be used as a bucket sprayer by removing the long lever and operating the Pump with the handle at the top of the plunger rod.

The sprayer is also suitable for whitewashing.

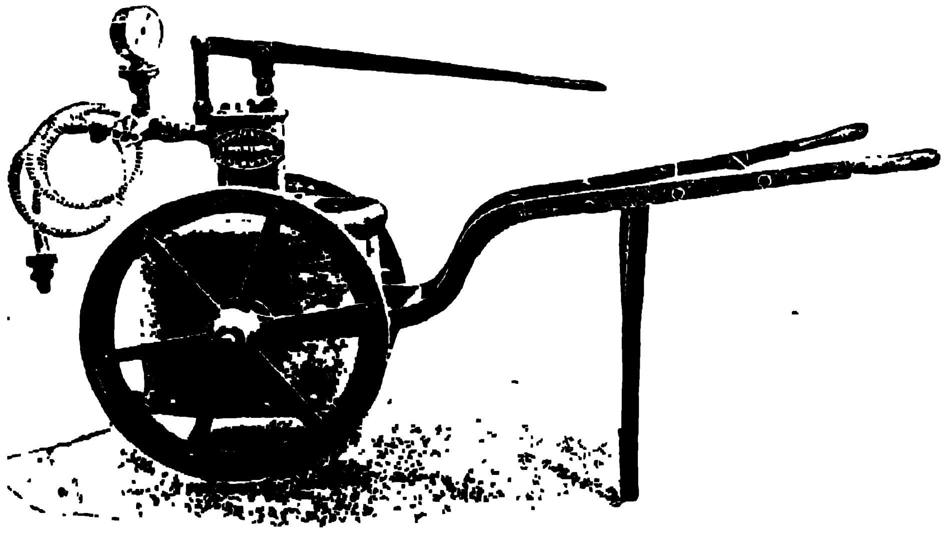
Fig. 1564, with 3½ feet of ⅜ inch Discharge Hose, large "Mistry" or "Vermorel" Nozzle and Pipe extension .. .. **Rs. 85**

Boiler Test Pumps.



The pump illustrated is specially designed to combine strength with the necessary lightness, in order that it may be conveniently carried by two men to any part of the shop where a test has to be made. It is universally used for hydraulic tests of boilers, pipes, etc. The Valves are of gun-metal, and the Lever of wrought-iron. It is provided with Double Shut-of Valve, and so arranged that the water can flow back into the tank. It can be worked up to 350 lbs. pressure per square inch.

Portable Type.



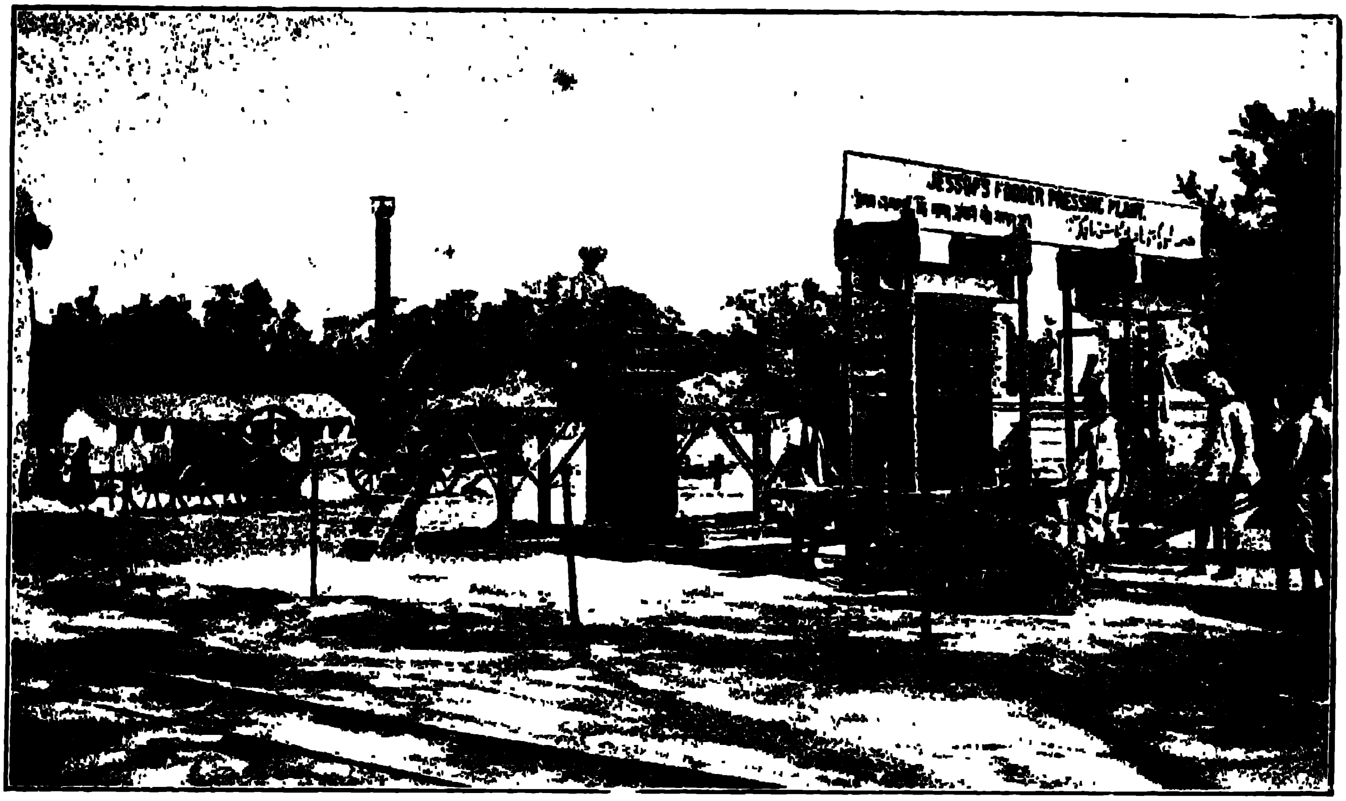
The portable type of Test Pump, as illustrated, is specially recommended for shops where it is in constant use, as it can be quickly moved from place to place by one cooly without first having to drain the water from the tank.

Specification and Prices.

Price of Pump, including 4-inch Pressure Gauge flexible pipe connections and Tank,

to work up to 250 lbs.	**Rs. 300**
" " " " 350 "	**" 320**
Mounted on Wheels	**" 430**

"Phoenix" Hydraulic Pressing Plant.



Our "Phœnix" Hydraulic Press was designed in the late nineties to meet the long-felt want of a light, strong and cheap press occupying little space, easily transported, erected and set to work and sufficiently simple in construction and operation to require only the class of local labour available in outlying districts.

The construction has been considerably improved in detail since the plant was first put on the market for Jute, and the press has since been adapted for dealing with Hides, Cotton, Hemp, Bhusa, Hay, etc.

Hydraulic power is provided by means of "Phœnix" Hydraulic Pumps, described hereafter in this catalogue, hand or power driven through belt and gearing by Portable or Horizontal Steam or Oil Engines.

The following are **a few of the advantages** claimed over other presses:—

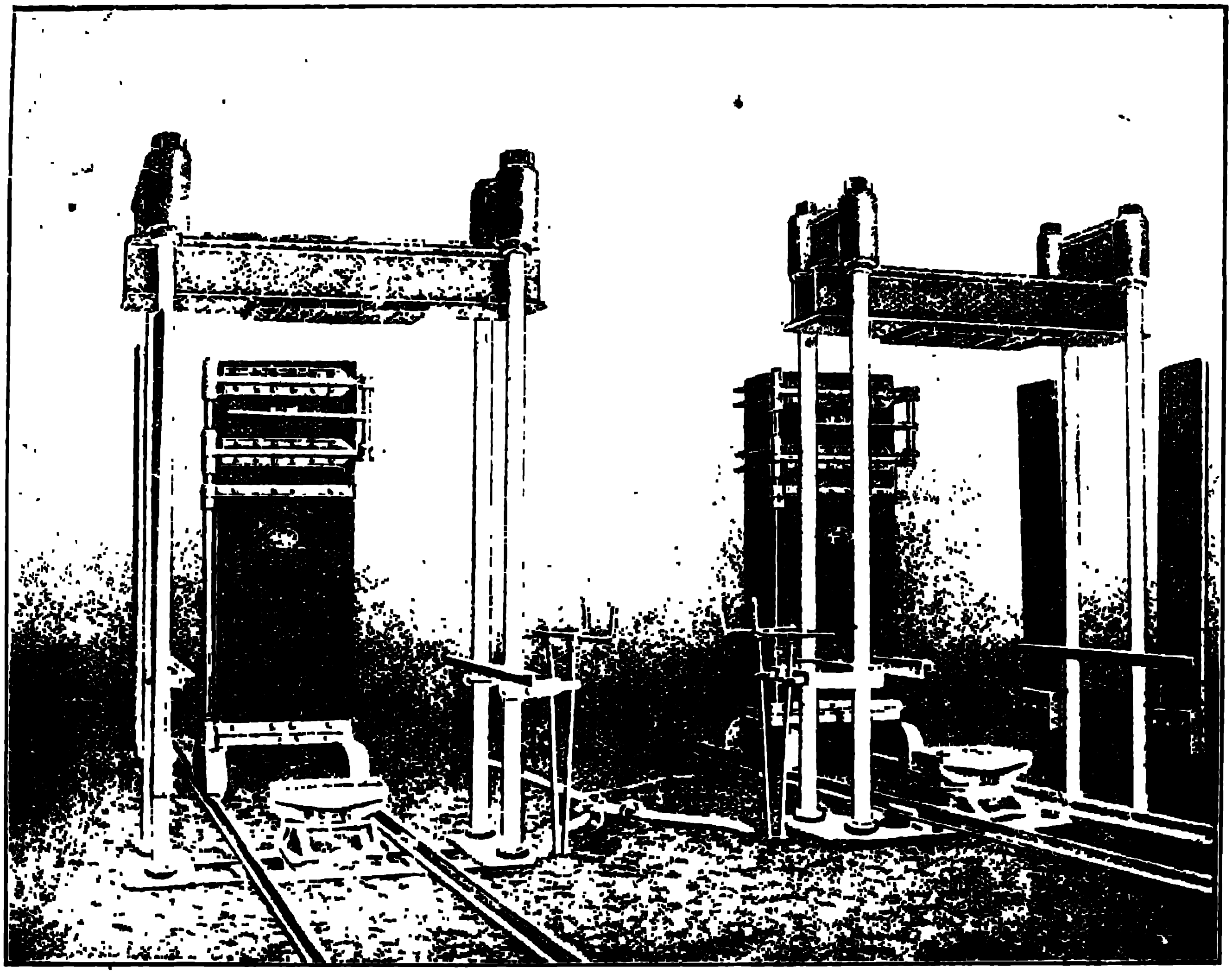
Simplicity of Construction.—Our Pressing Plant installations are the simplest in design and construction on the market and are the most easily maintained in working order with a minimum of liability to breakdown. No intricate parts to wear or break in transportation, all the repairs required to be done consist in renewing the neck rings and occasionally grinding valves. The absence of friction between metal surfaces such as is present in Screw and Lever Presses effects a great economy in upkeep. No pits or sunk masonry foundations are necessary and very little training is required to convert coolies into experts.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Phoenix" Hydraulic Pressing Plant.



Less power required to press a Bale in a Hydraulic Press than in any type of Screw or Lever Press.—It is an established fact that the mechanical efficiency of **Worms, Pulleys, Levers, etc.,** is very much lower than that of **well designed Pumps,** and owing to great frictional resistance a Screw or Lever Press is not within 30 per cent. as efficient as a Hydraulic Press.

Less time required to press a Bale.—Consequent on this greater efficiency of our Presses, a Bale can be pressed in less time with a given power than in any Screw or Lever Press. To this initial gain in time is added not only the time gained by the follower in our Press falling more rapidly than in Screw or Lever Presses, but also a conservancy of power as our follower is lowered by gravity

The strength is undoubted.—Hundreds are in use on Military Farms, Jute Collecting Centres, etc., some for over 25 years, and are giving satisfaction.

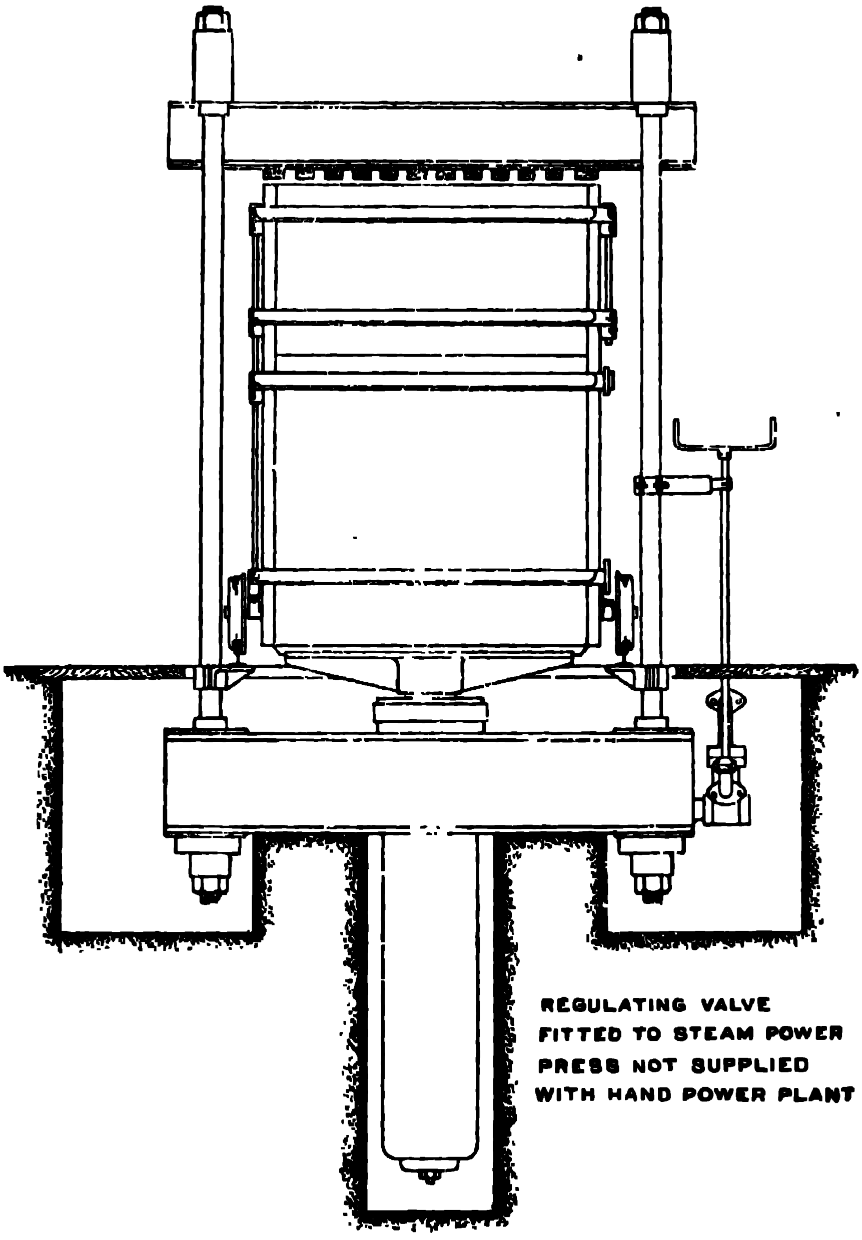
Lightness.—Ours is the lightest Press on the market and is easily portable on country bullock carts over *kutcha* roads in country districts.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Phoenix" Hydraulic Baling Press.



REGULATING VALVE
FITTED TO STEAM POWER
PRESS NOT SUPPLIED
WITH HAND POWER PLANT

The Press Cylinders, for small sizes and comparatively low pressures, are made of close grained cast-iron, and for larger sizes and high pressures cast-steel is used.

The Rams, in small sizes, are made of steel, and in larger sizes, of cast-iron turned and sheathed in gun-metal with one end fitted to the follower. The number and size of rams are determined by the pressure to be exerted.

Frames.—Four solid steel columns for each ram connect the top and bottom frames which are of heavy steel girder type.

Control.—The actuating levers and hydraulic regulating gear are all placed in the most convenient position for the operator, and the valves, which have been specially designed, give no trouble and are perfectly accessible.

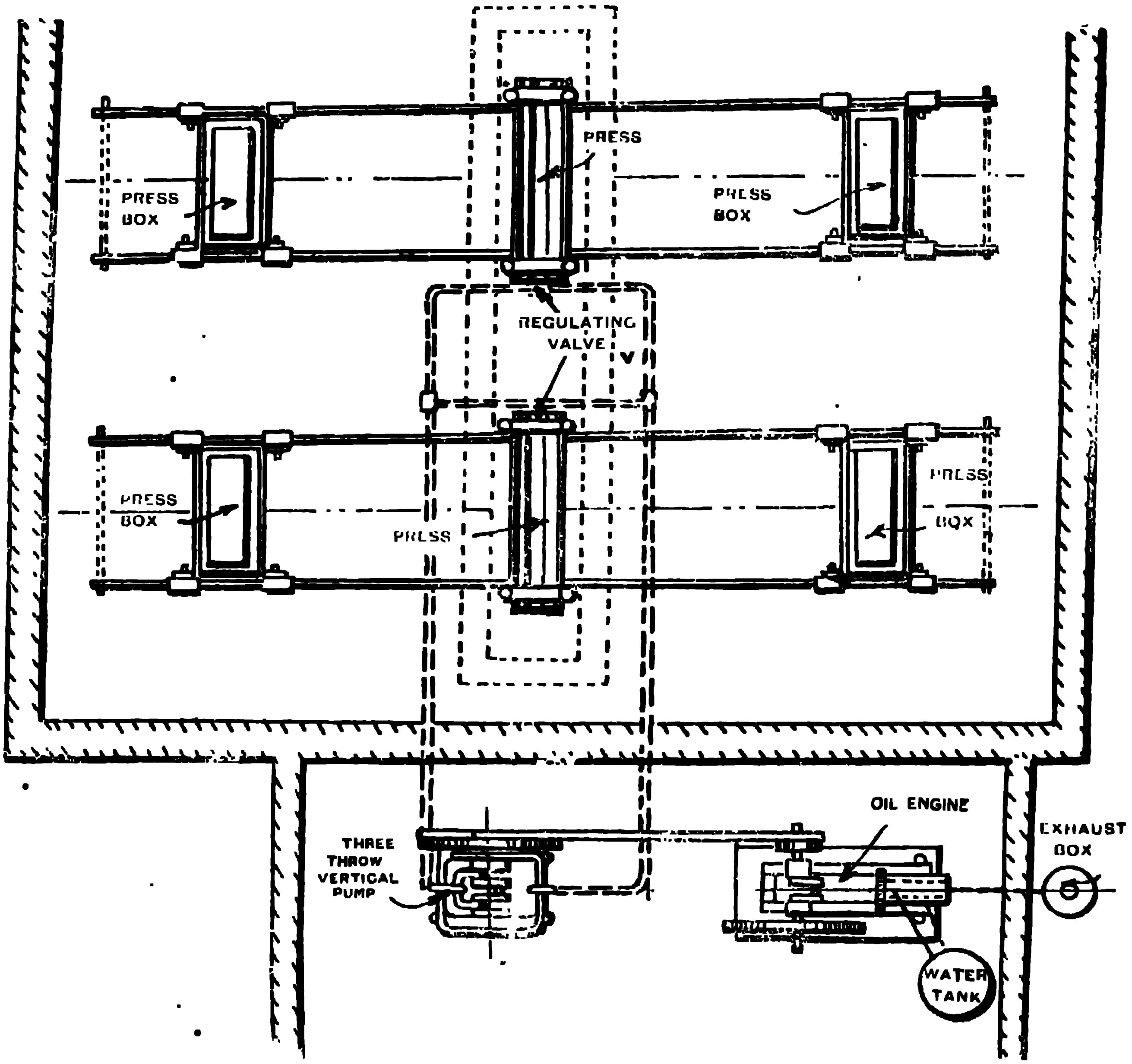
The Press Boxes are arranged to run in and out of the press on rails. The press complete comprises one box, but it is usual to supply two so that when one box is in the press the other is being filled with the material to be pressed, and the press is thus kept continually employed. Before the pressing of the bale is quite finished the box is opened out and run back to be refilled, a false bottom of the box being left under the bale whilst pressing and binding the bale is being completed.

The boxes are constructed of carefully selected teakwood and bound with steel angles and hinges and are made in standard sizes to suit the class of material to be pressed where no special sizes are required by constituents.

Jute Pressing.—We make Jute Presses in various sizes, the standard for *kutcha* bales being designed to press 3½ and 4 maunds bales to 48×20×18 inches. Standard arrangements of plants are shown on this page where hydraulic power is provided by a Vertical Three-Throw Hydraulic Pump driven by an Oil Engine, and on the following page where a Duplex Steam Pump served by a Vertical Cross Tube Boiler delivers hydraulic power to the presses.

The "Phoenix" Hydraulic Baling Press.

We also supply Hand Power Hydraulic Pumps where the output required is not so great and cooly labour is plentiful.

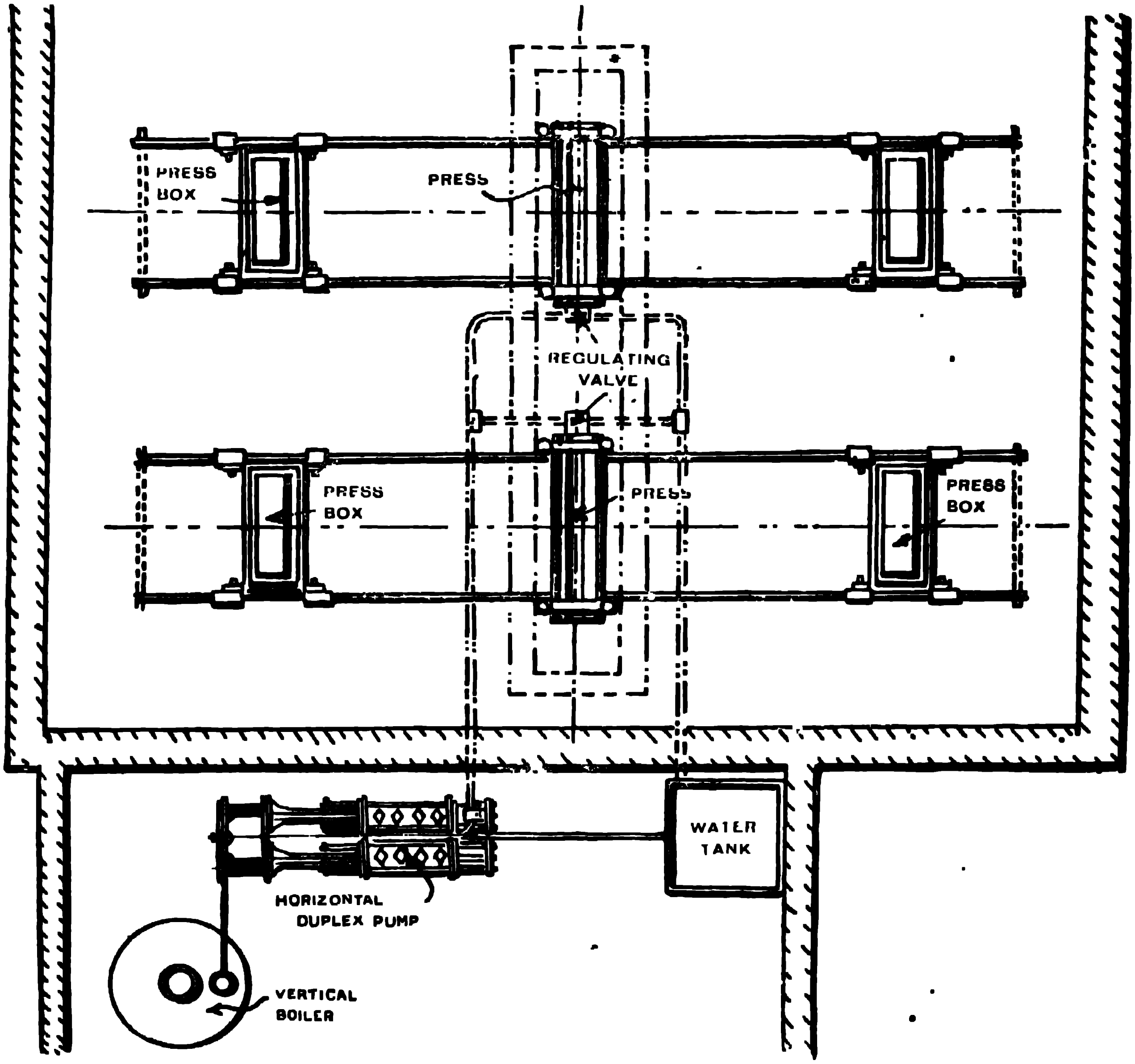


The illustrations of the presses appear on pages 781 and 782 and of the pumps on pages 787 to 789.

Fodder Presses.—We usually make these Presses to compress one maund bales of hay or bhoosa to 24×18×12 inches. Very high pressures are used and we have succeeded by the generous use of forged and cast-steel in attaining sufficient strength of construction without sacrificing lightness. Portability is usually an essential with this plant. We illustrate on page 781 a portable plant erected by us at the Allahabad Exhibition. We usually

The "Phoenix" Hydraulic Baling Press.

supply a Portable Steam Engine and Three or Four-Throw Horizontal Hydraulic Pump mounted on wheels. If Oil Engines are preferred we can supply Tangye's Kerosine or Crude Oil Engines of fixed or portable types for the purpose.



In addition to the foregoing we have a number of special adaptations of the Hydraulic Press in our works designed for the simplification of various operations, and are always pleased to quote for pressing plant for all purposes.

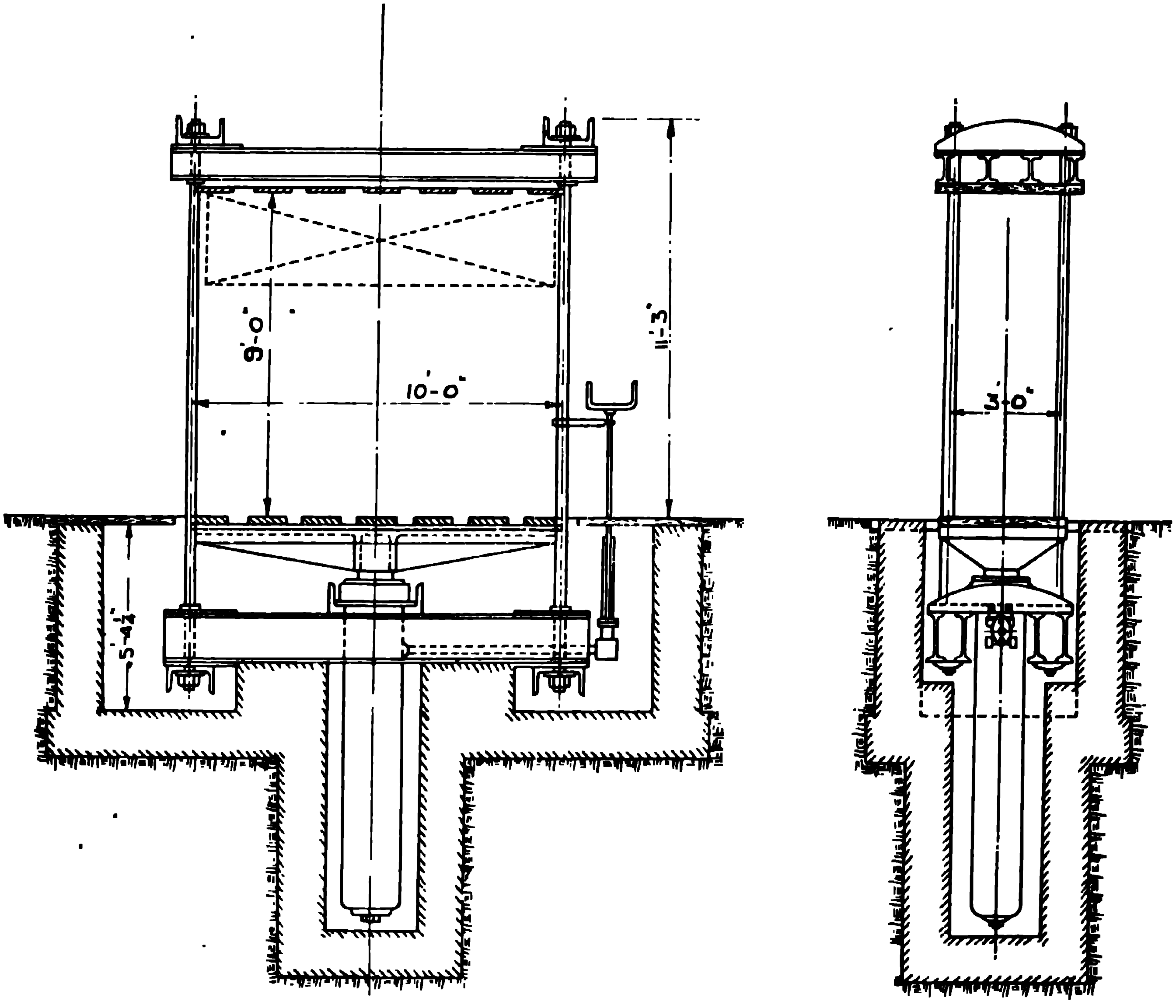
During the period of the war the whole of our press output was taken up by Government Military Farms and considerable numbers of presses were sent to Mesopotamia.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Phoenix" Hydraulic Baling Press.



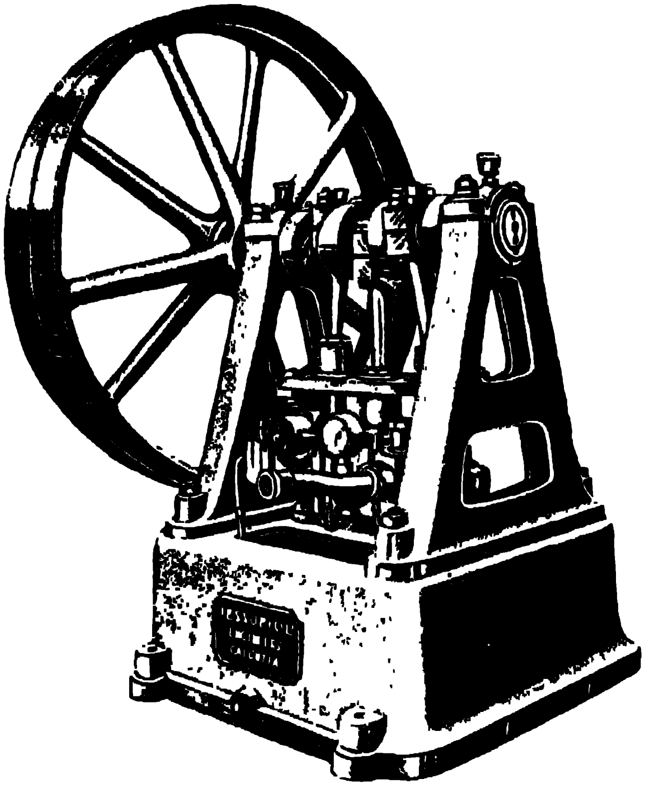
Hide Presses.—The principles of Hide Pressing differ from the Jute or Fodder Pressing inasmuch as the advantage to be gained by such high pressure is negligible. Larger cylinders are fitted as these work at a lower pressure and of course boxes are not required, the hides being stocked on the press table by cooly labour, the usual working pressure being ½ ton per square inch on the ram. The Vertical Columns are spaced 10 feet by 3 feet apart, thus allowing ample room for pressing the largest buffalo hides. Numbers of our Hide Presses may be seen working at the various Hide Pressing Factories in India.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Three-Throw Belt-Driven Hydraulic Pumps.



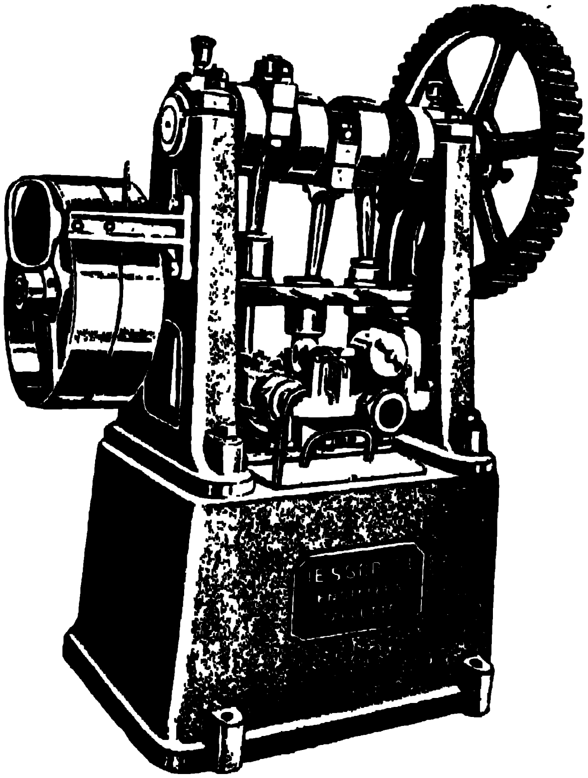
The illustrations on this page represent our standard type of Three-Throw Belt-Driven Hydraulic Pumps for Jute Presses. We frequently supply these with a Tangye's Oil Engine to drive them and sometimes they are driven from purchaser's existing shafting.

The power required for the Geared Pump (lower illustration) is approximately 3 B. H. P. and for the Direct Worked Pump (upper illustration) 7 B. H. P. The plungers, guides, valves and seats of these pumps are of a special non-corrosive gun-metal and the cranks are formed on the shafts by turning down from solid steel bars.

Special attention has been paid to the connecting rod bearings, the big end is fitted with gun-metal with ample bearing surface and the lower spherical bearing with special mixture of phosphor bronze for standing great pressures.

Automatic escape valves are fitted to knock-out the low and intermediate pressure plungers when the press ram is nearly home.

The frame, which also contains the water tank is of massive cast-iron construction and the whole is a very workmanlike job.

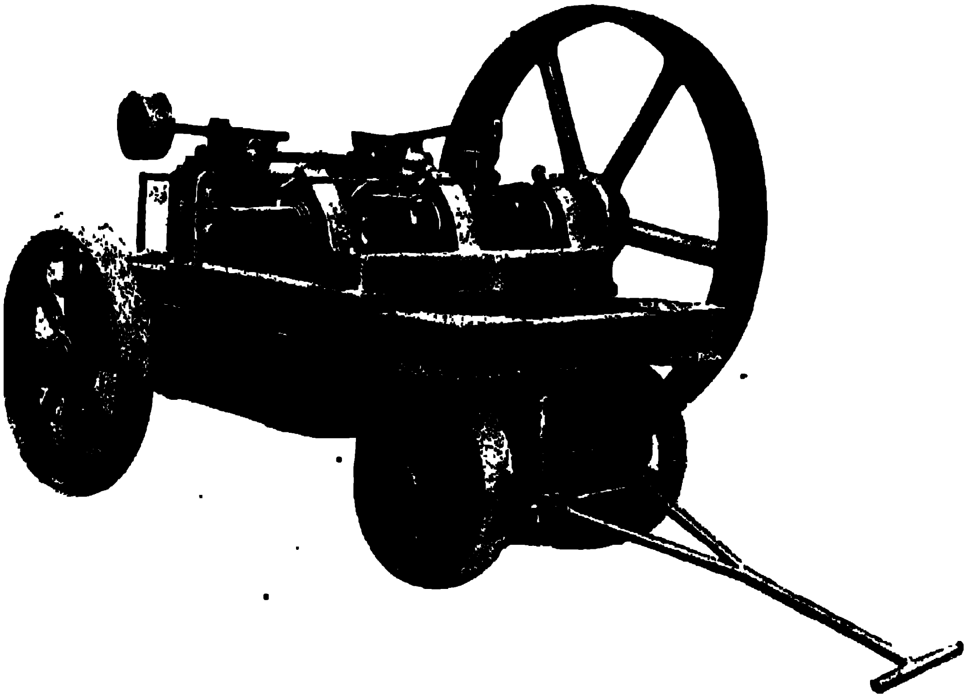


CALCUTTA, JAMSHEDPUR.
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

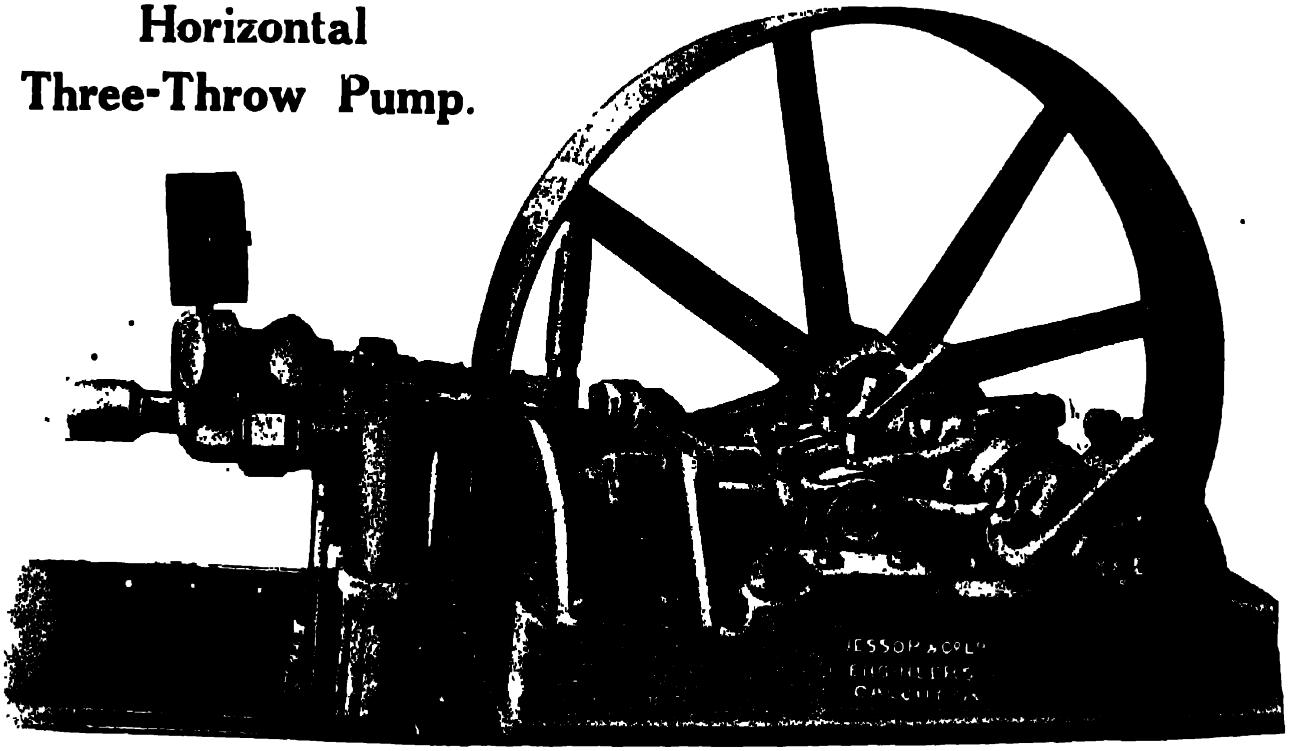
The "Phoenix" Portable Horizontal Pump.



A Four-throw Pump designed by us for working three presses where a large output is required. It is specially adapted for Hay Presses for a working pressure of 1 ton per square inch. The crankshaft is turned out from the solid bar: the pumps are fitted with automatic knock-out gear and the whole set on a substantial cast-iron bed-plate.

The pump can be supplied with or without carriage. In the former case it may be fitted with a rigid lattice connection for keeping the pump at a fixed distance from the engine and also for hauling it from place to place.

Horizontal Three-Throw Pump.



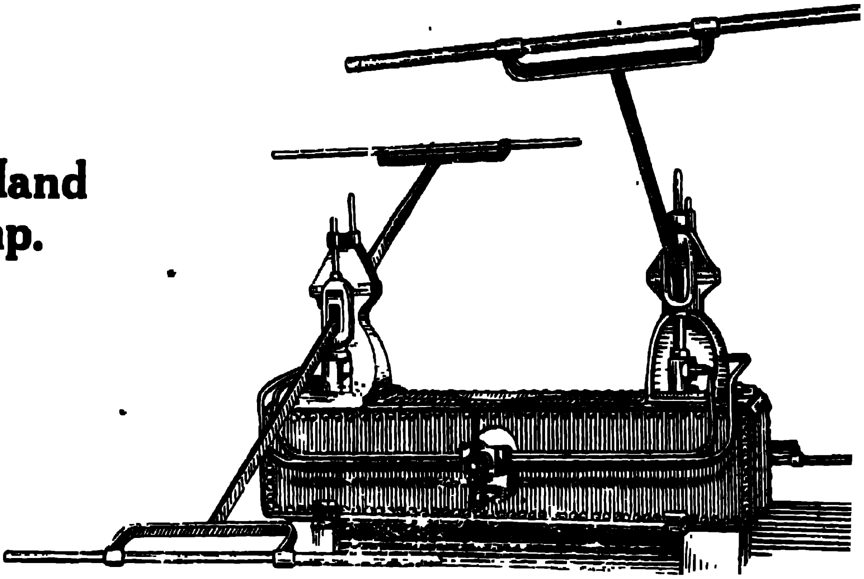
This design was evolved from that of our Standard High Pressure Pump for Hay Presses. The three cylinders are cast in one, making a very compact arrangement. The valves, seats and plungers are of a special mixture of gun-metal, found to give the best results. The crankshaft is turned out of a solid steel bar. A heavy flywheel is fitted and the frame is of close grained cast-iron of massive design. Our 1915 pattern is similar to the above but certain details have been modified to make the parts more accessible for adjustment and repairs.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

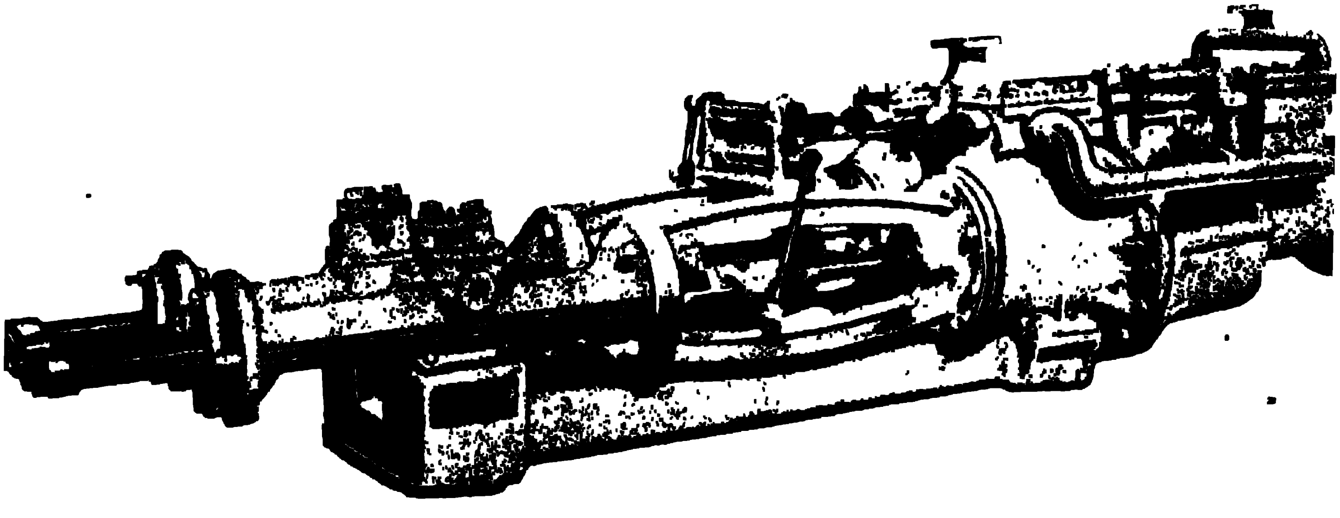
JESSOP & Co. Ltd ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

The "Phoenix" Hand Power Press Pump.



This pump is designed for working a single press with one or two boxes when it is desired to work by manual labour only, and the ratio between the large and small plungers is such that the greatest economy of power is attained, thus securing the maximum efficiency. This pump is very frequently supplied with hide pressing installations where the number of bales required per hour is not usually as great as jute balers require in their busy season.



The "Duplex" Pressure Pump.

This pump has been specially designed to work our Hydraulic Baling Presses. It is positive in action and will start from any position. It is fitted with gun-metal valves, valve seats and plungers minimising friction and wear due to corrosive substances in the water, and our present models represent the experience gained on a very large number of pumps working under all conditions.

The pump stops automatically when the maximum pressure is reached; no **Safety Valves** are required.

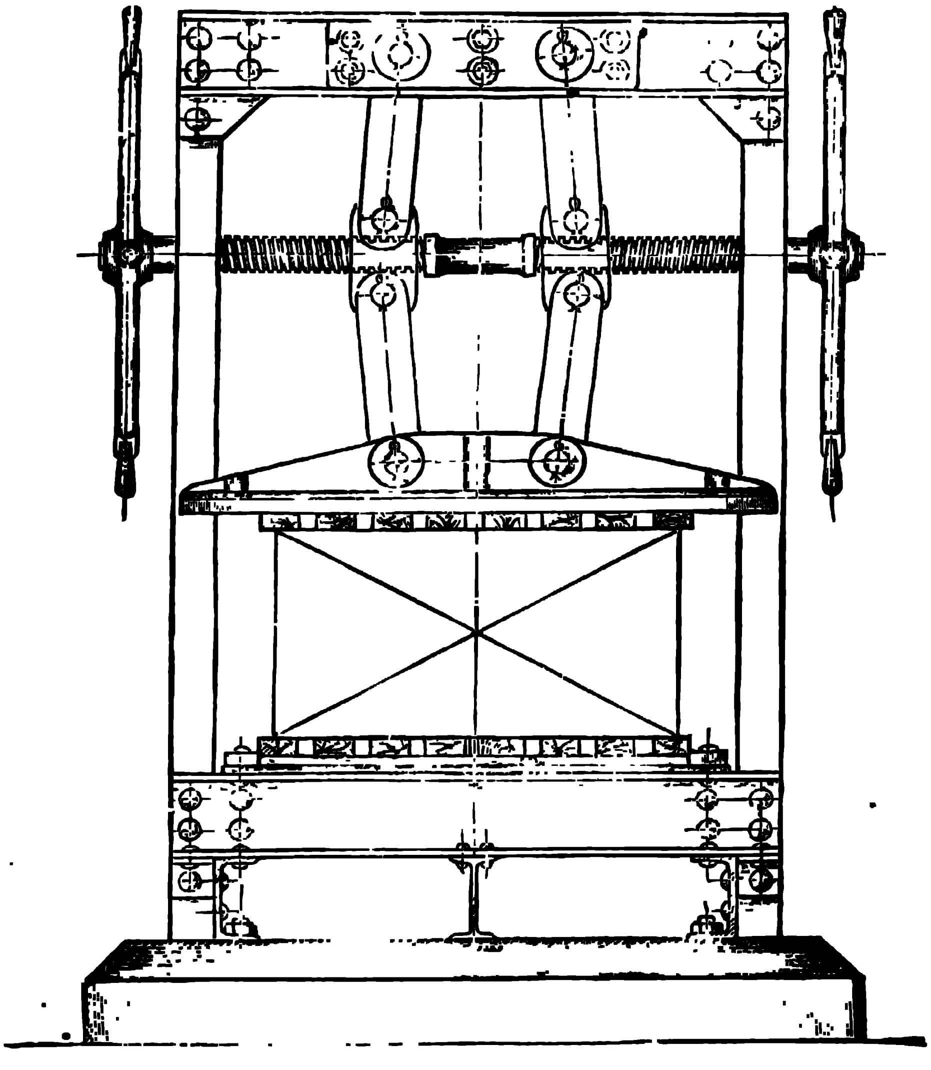
Where fuel is expensive we recommend a similar type of pump to the above but with compound cylinders, thus ensuring an economy of steam consumption at a slightly increased first cost.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hand Press for Cotton Fabrics and Miscellaneous Products.

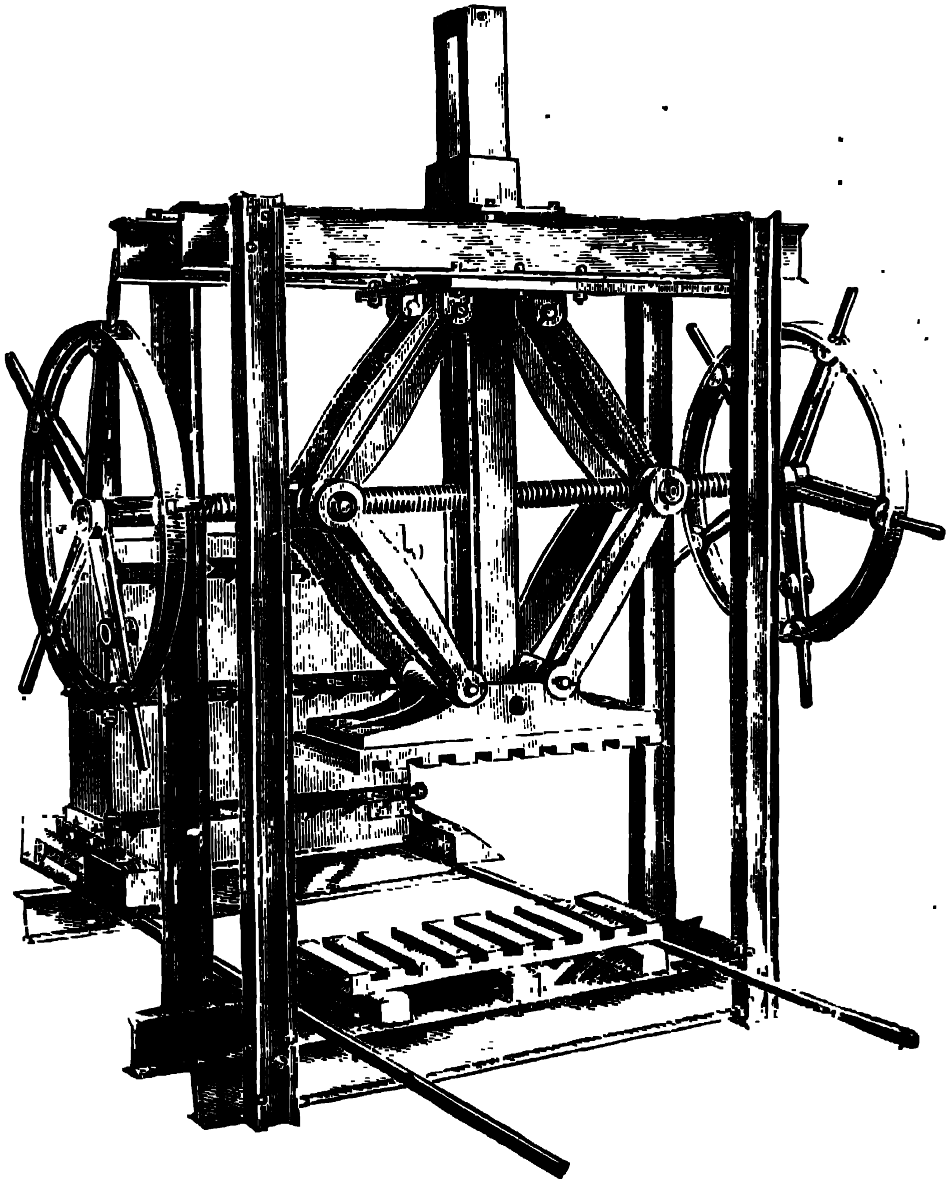


We have made a number of special Presses for Jails, etc., for special work to fulfil customers' own specifications for pressing cotton goods, tobacco, tin sheets, etc., etc. We shall be pleased to quote special rates on receipt of definite enquiries.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, **JESSOP & Co. LTD ENGINEERS** RANGOON, MADRAS, BOMBAY, LONDON.

"Phoenix" Hand Power Jute Press.

For 1 md. and 1½ md. bales of Jute.



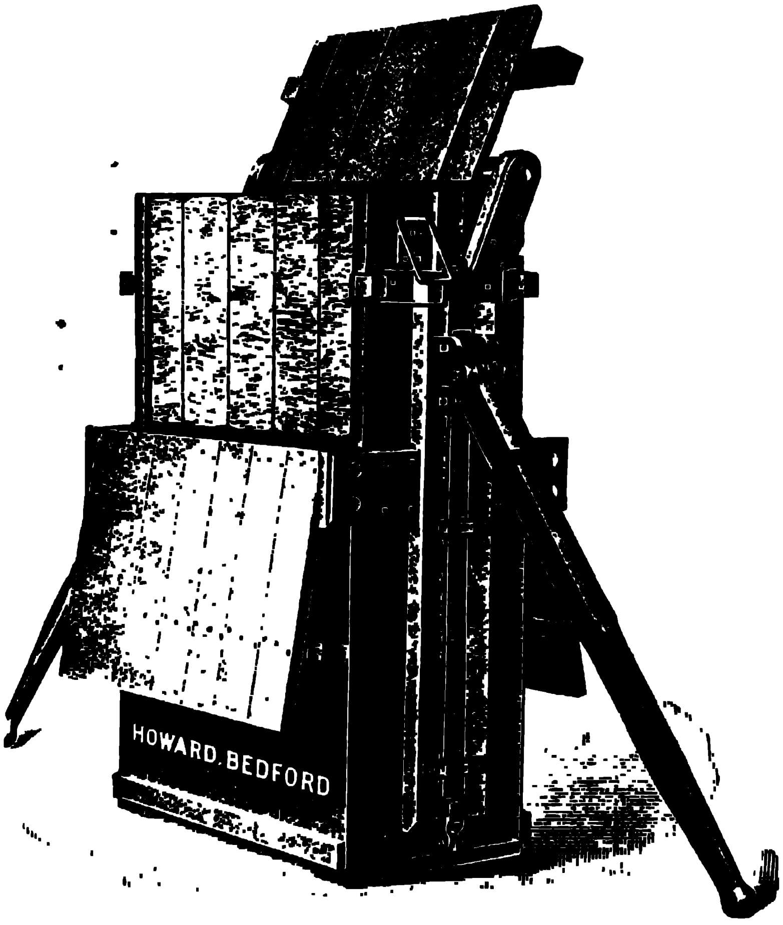
This type of Press is common in Bengal. The frame is entirely made of rolled steel sections and the arms and followers of cast-iron. It is substantial, durable, simple and easily transported, and has a capacity of from 10 to 12 bales per hour.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hand Power Baling Presses.



R. C. S.2. Steel Box Press.—Two men work the Press and bales are made in ten to fifteen minutes. The top turns up on hinges for filling and is secured by links holding the top bar; pressure is applied by the men working the levers, each of which is fitted with two pawls engaging in racks, to the lower ends of which the false bottom or platen is connected. The lower pawl lifts the rack and platen, whilst the upper pawl engages in the rack and holds the platen up.

The operation of pressing is very simple. A false bottom or platen provided with slots for the bands is let down to the bottom of the box by releasing the pawls from the racks; the material is put in by hand, trodden down when necessary, and, when the box is full, the top platen is turned into position and secured.

The men working the levers cause the steel racks to rise, carrying with them the bottom platen and pressing the materials against the top platen.

When the racks have been raised and show that the bottom platen is above the bottom of the side doors the bale is ready for binding. The doors are opened for the purpose, and after binding, the top is released and turned back, and the bale removed.

R. C. S.4. Steel Box Press.—It is smaller in size and is made throughout of the same thickness of material, and as the same total pressure is applied over a smaller area, bales are pressed tighter, and the Press possesses greater rigidity. **This Press is used principally** for *kutcha* Jute Bales.

Water Purification.

We beg to draw our constituent's attention to the special catalogue issued by our Water Purification Department entitled **"Water Purification and Distribution"** details of which we have not included in our General Catalogue as the subject appeals to a comparatively limited number of our constituents. We shall, however, be pleased to forward a copy to anyone who is interested in this branch of Engineering work.

Our experience in the construction of Filter plants in India covers a period of over twelve years during which we have been responsible for plants supplying up to 10,000,000 gallons per day. The principles of the filtration of water are well known, and it is generally conceded as the result of experience that **Rapid Filtration** offers the best solution to the problem of dealing with the Seasonal changes in the character of Indian water supplies. To ensure the continual and satisfactory operation of a filter plant in India, it is essential that the conditions under which the plant has to operate should be taken into consideration in its design. The operation is sometimes dependent upon comparatively unskilled men, and the mechanical details of the plant must be such as to demand only a routine knowledge on the part of the operators.

Water Purification.

In offering the **Phœnix Filter** we are able to meet these requirements as our knowledge of all the conditions to be encountered in this country has enabled us to prepare a design especially adapted for use in India.

As an adjunct to filtration, modern practice has tended to provide for the chlorination of the effluent, and in this connection we put forward the apparatus manufactured by Messrs. Wallace and Tiernan Co., Inc. Newark, New Jersey, U.S A., who have the widest experience in this business.

In many cases efficient chlorination is all that is required to ensure the purification of a water supply, and in these instances the cost of installing a Wallace and Tiernan Chlorinator is so small that we anticipate this modern development will become widely known as its merits are realized.

We have endeavoured to make our **" Water Purification and Distribution "** catalogue of real value to all who are interested in Water Works Schemes and the tables, diagrams and formulæ it contains will, we trust, be of assistance.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

ELECTRICAL
PLANT

APPARATUS & APPLIANCES

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Lancashire Dynamo and Motor Co., Ltd.

Associated with

The Crypto Electrical Co., Ltd.

Turbo-Alternators

Standardized in sizes up to 6,000 K.V.A.

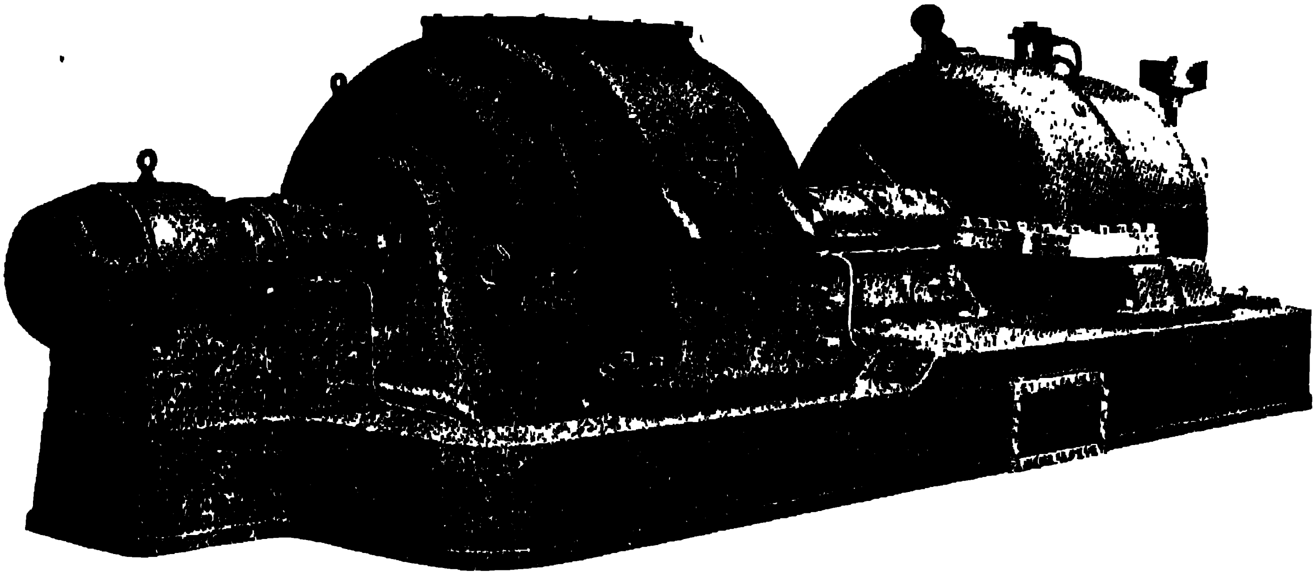
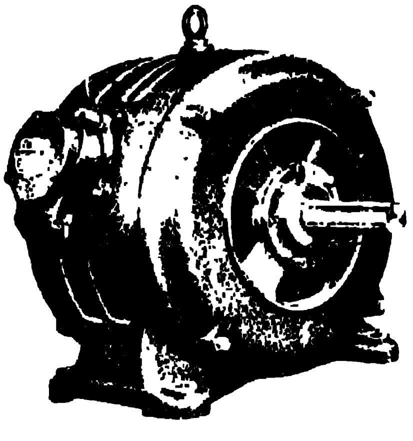
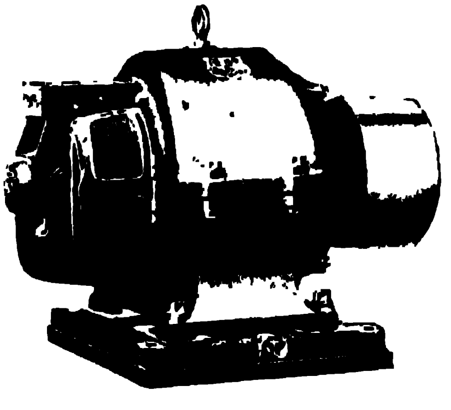


Fig. 1. 1875 K.V.A. Lancashire Turbine Driven Alternator.



Typical A. C. Machine.
(Ask for leaflet No. 700.)



Typical D. C. Machine.
(Ask for leaflet No. 200.)

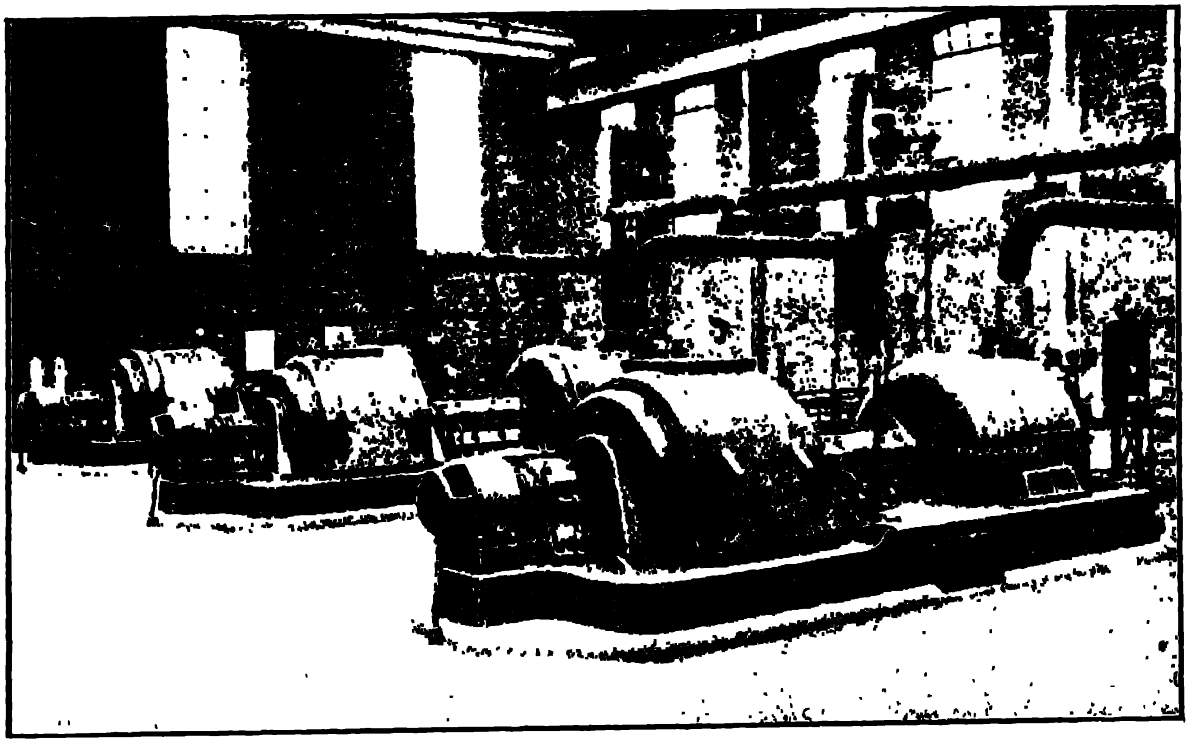
"Lancashire" Motors and Dynamos represent the highest standard of British manufacture, every possible care being taken in the choice of materials and workmanship. We carry large stocks of both A. C. and D. C. machines for all standard supply voltages. Quotations for machines of any size and type will be submitted upon receipt of enquiries. Spare parts for all machines are kept in stock and special facilities exist at our Works for carrying out repairs to "Lancashire" Machines of all types and sizes

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Lancashire Turbo-Alternators.



Lancashire Turbo-Alternators installed in an Industrial Power Station.

The initial design of Lancashire turbo-alternators was based on certain fundamental ideas as to what was required to produce an ideal machine. These ideas embodied a strong stator of sound mechanical and electrical construction with immovable windings imperviously insulated; a robust rotor accurately balanced and with solidity of construction to resist the stresses due to the high speed of rotation; and a well defined effective ventilating system.

That the design was right and its principles properly applied, mechanically and electrically, was indicated by the fact that the first machine built was absolutely correct, the results anticipated being obtained without any alterations and the machine has been in operation ever since with continued satisfaction. These results, proving the superiority of the design at its inception, have been the incentive for all subsequent Lancashire turbo-alternators to be made to the same high standard, the repeat orders received endorsing their consistent, efficient performance.

Particulars and Prices on application.

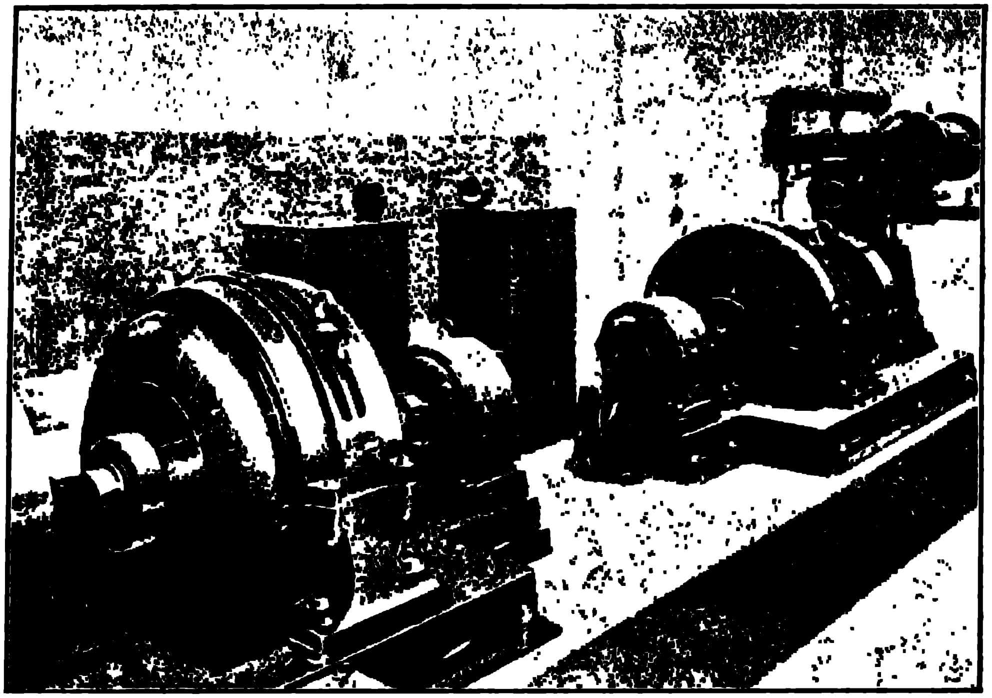
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Power Factor Improvement by Self-Starting "Lancashire" Synchronous Motors.

Leads to economic results of great importance.



"Lancashire" Self-Starting Synchronous Motors, driving Air Compressors and improving the Power Factor of the System.

The advantage of the Synchronous Motor as compared with the ordinary Induction Motor, is that it can be used to Improve Power Factor.

"Lancashire" Self-Starting Synchronous Motors overcome all starting and synchronising troubles, and no difficulty has been experienced in their application to driving Air-Compressors, Blowers, Fans, Pumps, Line Shaftings, etc.

Neither starting motors nor synchronising gears are used, and the switchgear is designed so that it cannot be operated in other than the correct manner. Thus, damage by careless handling is prevented, and highly skilled attention is unnecessary.

The "Lancashire" Self-starting Synchronous Motor can be started up as easily as a slip-ring induction motor, the operations being similar. Current is first switched on to the stator winding, then the starter handle is moved round slowly to the running position, and the motor pulls itself into synchronism.

By adjusting the field strength of the motor, it is possible to regulate the amount of leading current drawn from the mains, thereby cancelling the lagging currents taken by induction motors, and the power factor of the system is raised.

Full Particulars and Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Electric Lifts for Passenger Service

Made by

Smith, Major & Stevens, Ltd.

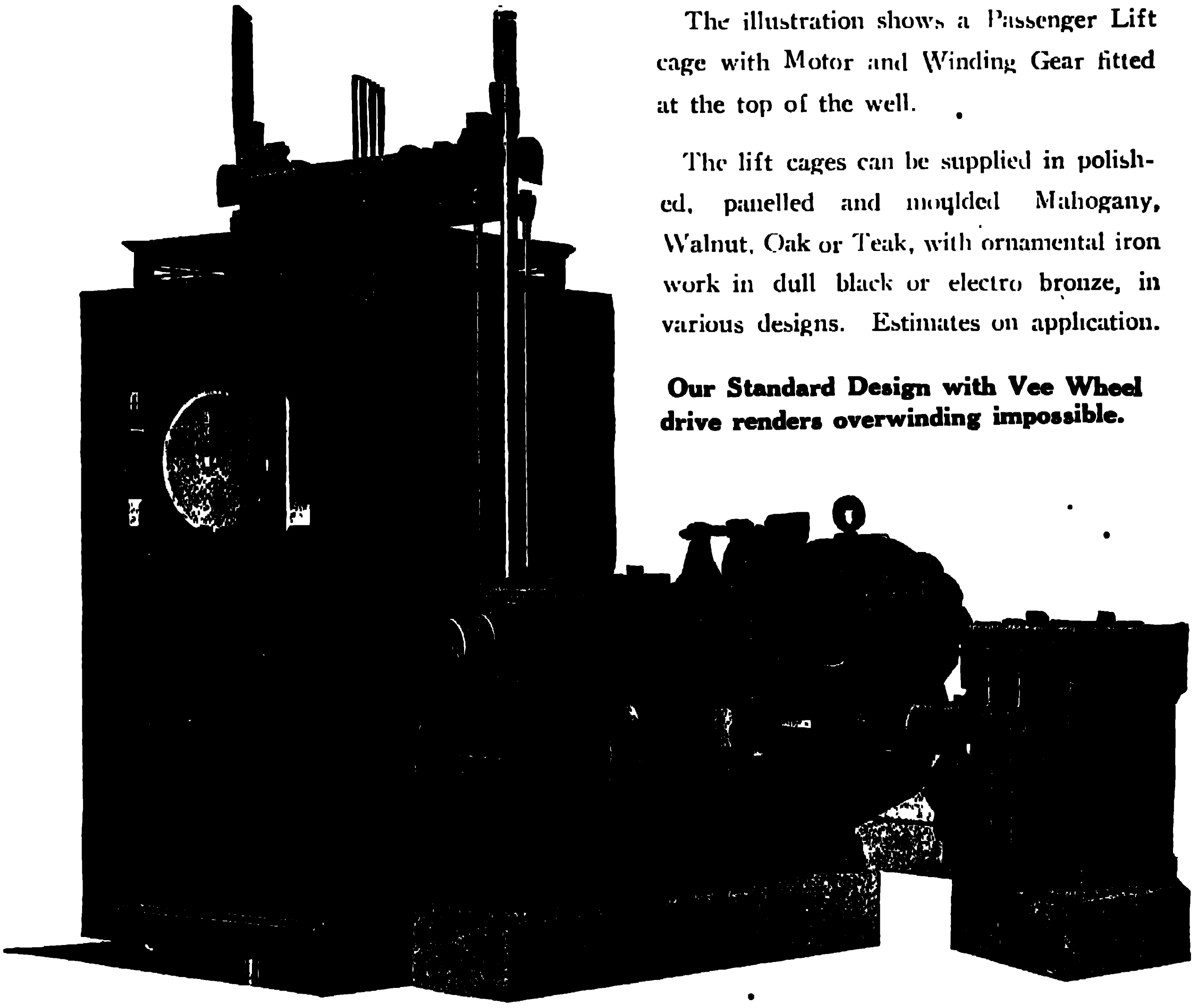
We are in a position to supply Electric Passenger and Goods Service Lifts for Hotels, Clubs, Offices, etc., and shall be pleased to furnish estimates on receipt of full particulars. Where Electric Power is available this type of Lift is undoubtedly the best and cheapest to maintain. The increased first cost as compared with hydraulic lifts is recovered in about three years by the saving in working of Electric Lifts.

Send your enquiries and we shall be pleased to quote.

The illustration shows a Passenger Lift cage with Motor and Winding Gear fitted at the top of the well.

The lift cages can be supplied in polished, panelled and moulded Mahogany, Walnut, Oak or Teak, with ornamental iron work in dull black or electro bronze, in various designs. Estimates on application.

Our Standard Design with Vee Wheel drive renders overwinding impossible.

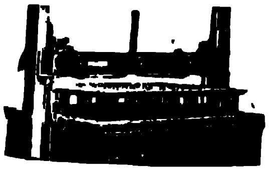


Combination for Express Passenger Lift with Electric Control from Cage.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEE

RANGOON, MADRAS,
BOMBAY. LONDON.



Electric Lifts

Made by

Smith, Major and Stevens, Ltd.

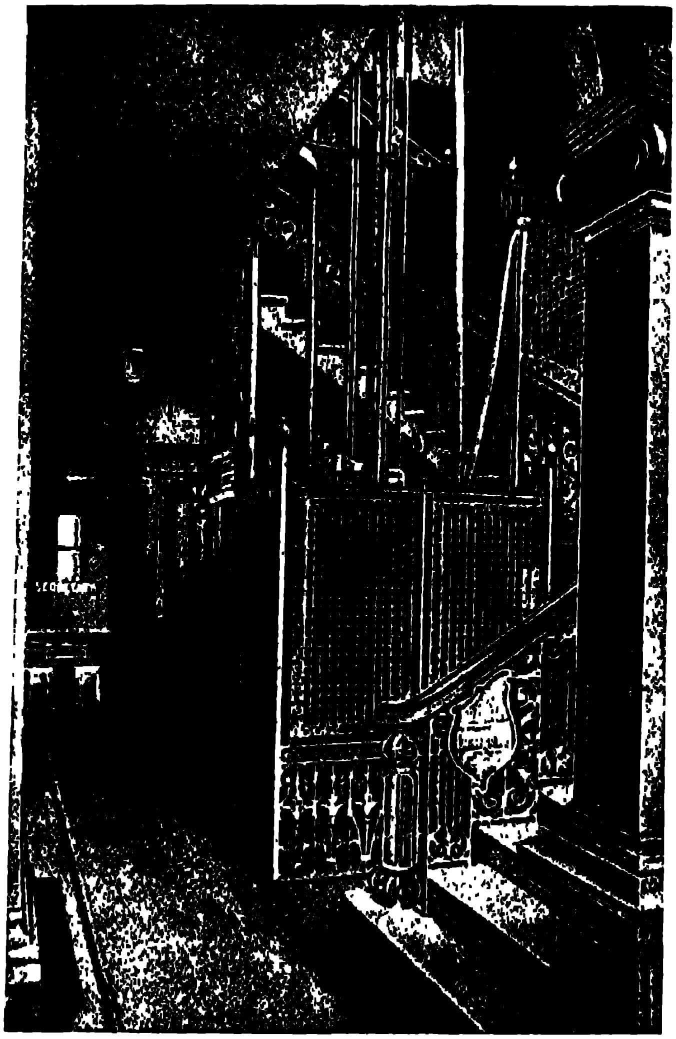
The essential features of a good lift are comprised in—

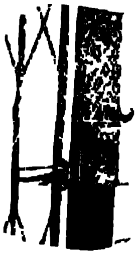
Good Design. Good Workmanship.

These points are embodied in every part of Smith, Major and Stevens' Lifts. They are specified and used by all the Leading Authorities and Architects.

List of Some of the Indian Users.

	No of Lifts.
Ely. Ins Co, Bombay ..	1
Burn and Co, Calcutta ..	1
Wheeler's Buildings, Bombay	1
Cellular Jail, Port Blair ..	1
Bank of Bombay . ..	6
Chartered Bank of India, Bombay	1
Do. Calcutta	2
Crompton and Co Calcutta	2
Calcutta Turf Club	1
General Hospital, Rangoon	1
Osler, Ltd., Calcutta ..	2
Forbes, Forbes, Campbell, Bombay . ..	1
Norton and Sons, Calcutta ..	1
British and Foreign Bible Society, Bombay	1
Crompton	3
Government Press, Rangoon	2
Physiological Laboratory, Bombay	1
Indian Palace, Nepal	1
Rannagar Palace	1
Port Trust Buildings, Karachi	1
Cox and Co's Bank	1
Miller and Co, Ceylon	1
Steel and Co, Calcutta	2
Alliance Bank of India, Delhi	2
Alliance Bank of Simla	1
Messrs Chand Kedar Nath, Calcutta .	1
Delhi Station Buildings, E I Ry.	2
M. and S M. Ry, Madras	2
Butler Palace, Lucknow	1
Calcutta Port Commissioners	12
Messrs. Mackinnon, Mackenzie and Co., Calcutta	12
Imperial Secretariat, Delhi	16
Rangoon Development Trust	1





Selected List of Users.

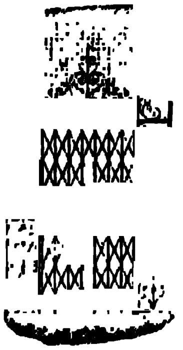
The Houses of Parliament ..	2
The British Admiralty for Super-Dreadnoughts .	112
The Chilean Admiralty for Super-Dreadnoughts ..	14
S.S. "Aquitania," Cunard Steamship Co :. .	10
The Institution of Civil Engineers, New Premises	6

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

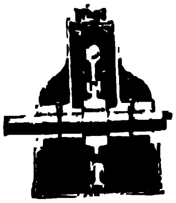
JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Electric Lifts for Goods Service.



The Electric Lifts for Passenger and Goods Services which we offer are of the very latest types by the well-known firm of Smith, Major and Stevens, Ltd. They are fitted with all the usual appliances for safety, and with their patent duplicate safety gear, hold an unbroken record of over 30 years of reliability and safety. A testimony to the high reputation of this gear is afforded by the fact that many competitors have followed their lead.

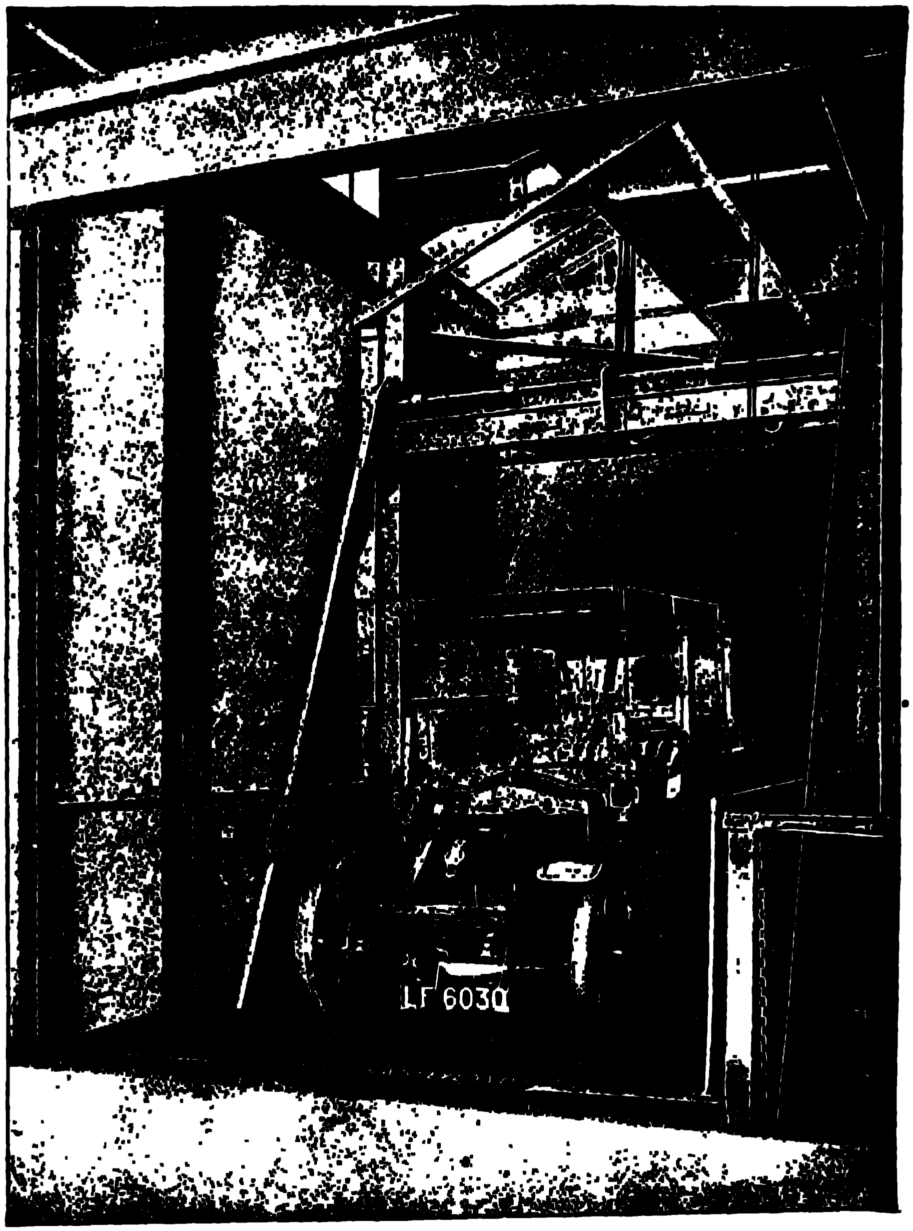


This illustration shows a Goods Lift arriving at the 3rd floor of a commercial building with a motor car direct from the street.

The Motors and Gears can be fitted at the top or bottom of the well as required. They can be adapted for loads from 3 to 60 cwts. from the ground floor to 4th or 5th floor as required. Write for particulars stating requirements.

The Advantages are:—

1. Improved Balance Brakes.
2. Patent Automatic Controllers.
3. Emergency or Overtravel Switches.
4. Patent Duplicate Safety Gears, so arranged that the stretching of any one of the lifting ropes will throw 2 grips into action simultaneously, preventing descent and giving warning of approaching failure.



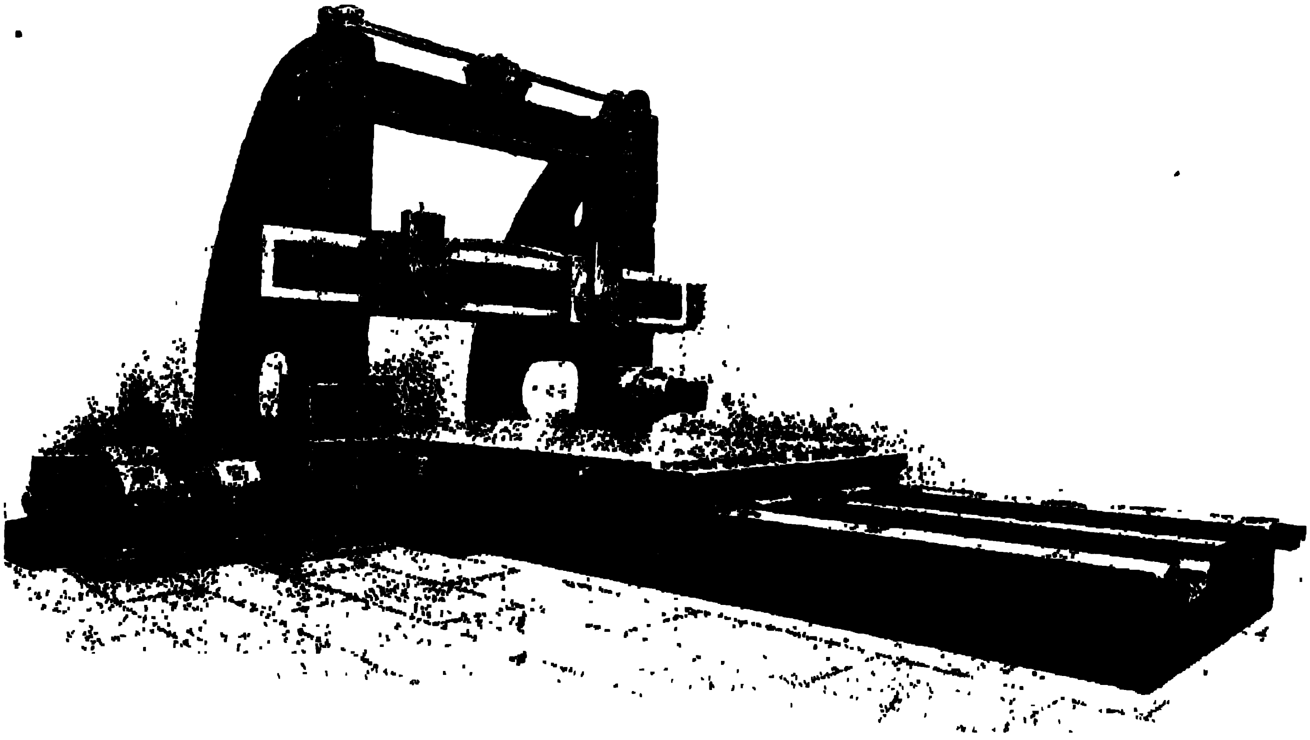
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

The "Lancashire" (Patent) Electric Drive for Planers

And Other Reciprocating Machine Tools.



10ft. × 10ft. × 25ft. "Hetherington" Planing Machine with "Lancashire" Planer Drive.

Cutting speeds, 15 to 60 f.p.m. Return speeds, 60 to 100 f.p.m.

Six Special Features of the "Lancashire" Drive.

(1) **Speed Variation.**—20 speeds on the cutting stroke from the lowest any particular class of work demands to the highest that the cutting tools will stand, with a margin for future improvement in tool steel.

(2) **Return Speeds** of values impossible with any other form of drive.

(3) **A Foolproof Equipment,** the internal arrangement of which the operator need know nothing. He has buttons to push for "Stopping," "Starting," or "Inching" the table, and simple speed control handles to turn.

(4) **An Economical Equipment** by which the stored energy in the revolving parts is not wasted at each reversal of direction, but is partly returned to the line in the form of current, and partly used as a cushion for starting the next stroke.

(5) **A Universal Equipment** which can be used for either A.C. or D.C. circuits.

(6) **A Maximum Output Equipment** which can be speeded up to maximum return speed when "cutting wind."

Full Particulars and Prices on application.

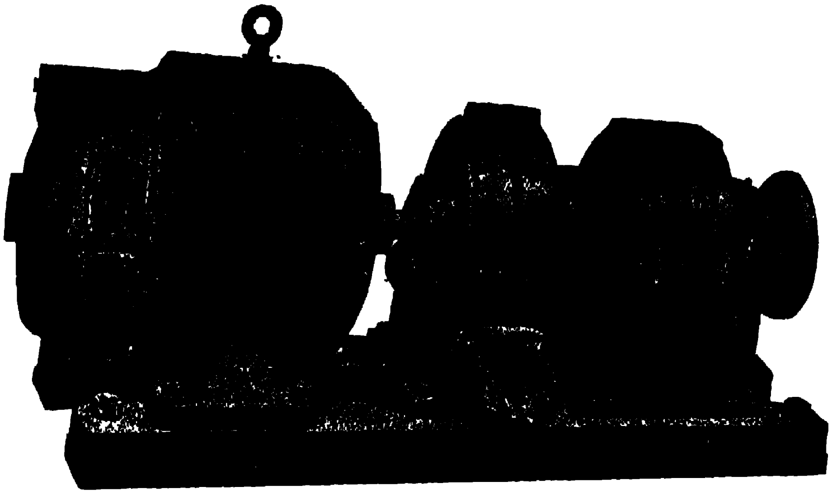
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS.
BOMBAY, LONDON.

The "Lancashire" Junior Planer Drive.

(Patent.)



Complete "Lancashire" Junior Planer Drive (excluding Switchgear.)

The Lancashire Dynamo and Motor Company led the world for ten years with the "Lancashire" Planer Drive, now extensively imitated by competitors.

The "Lancashire" Planer Drive entirely meets the requirements of the user of a **large** planing machine, giving a very wide range of speed, a perfect reversal, and complete control over even the heaviest table.

To meet the requirements of users of **small** planers (up to 4 feet), we have developed a drive which, after exhaustive tests in our works, is proving as complete a success as the original drive.

We have been two years developing and experimenting with the **Junior** Drive, and it is now a thoroughly tested device embodying all the experience acquired in 15 years' study of the driving of planers.

We confidently expect this drive to take the same pre-eminent place as the best drive for small planers that the "Lancashire" Planer Drive still holds in the large planer field.

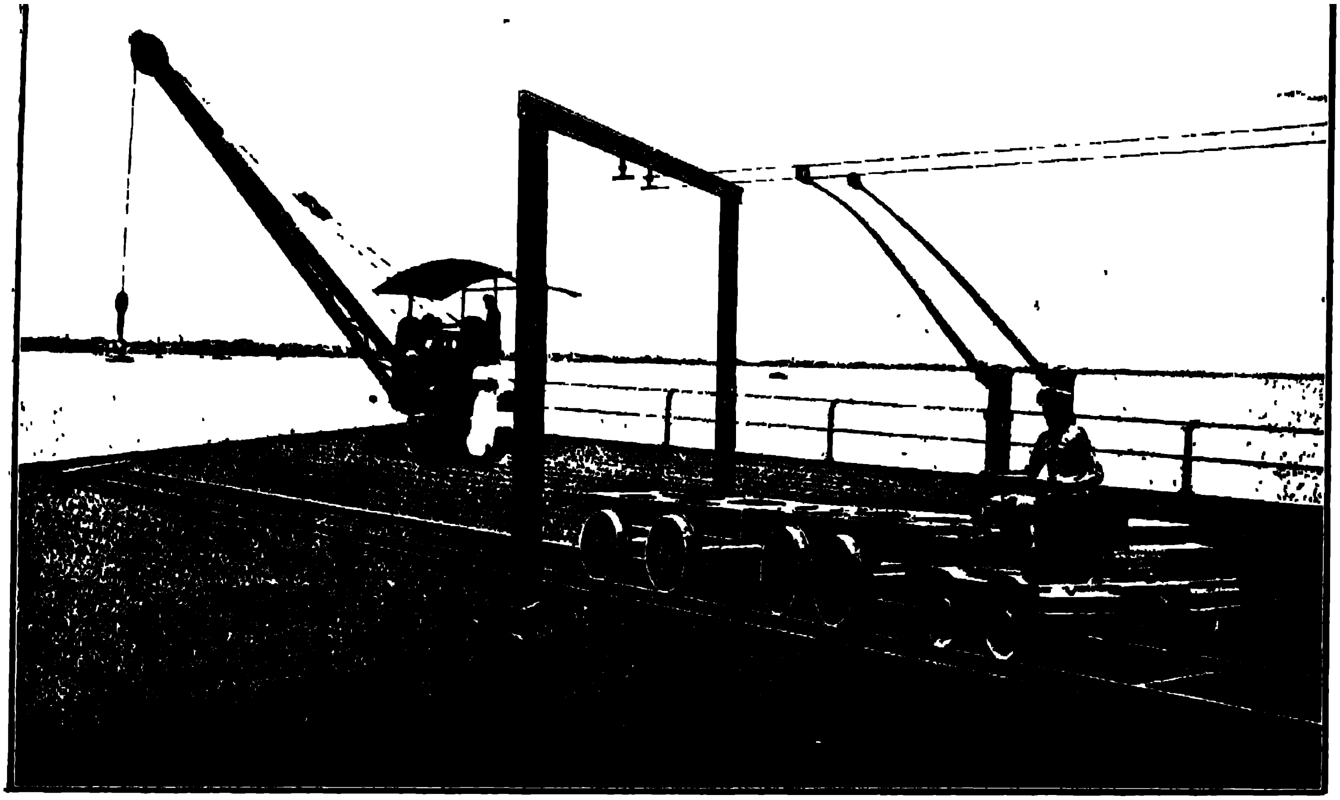
Full Particulars and Prices on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Modern Electric Transport Methods.



The above illustration represents the most up-to-date method of transport in Mills and Factories for rapid handling of raw and manufactured materials.

The Electric Crane is fitted with Hoisting, Slewing and Derricking Motions for handling the usual 30 cwt. loads on the Jetty, import and export to and from the barges in the river.

The loads are deposited on trucks and transported by an Electrically Driven Locomotive into the godowns, while further trucks are being loaded at the jetty ready for the return of Locomotive with empty trucks.

The Loco is capable of propelling or handling loads up to 14 Tons @ 6 miles per hour and lighter loads at increased speeds.

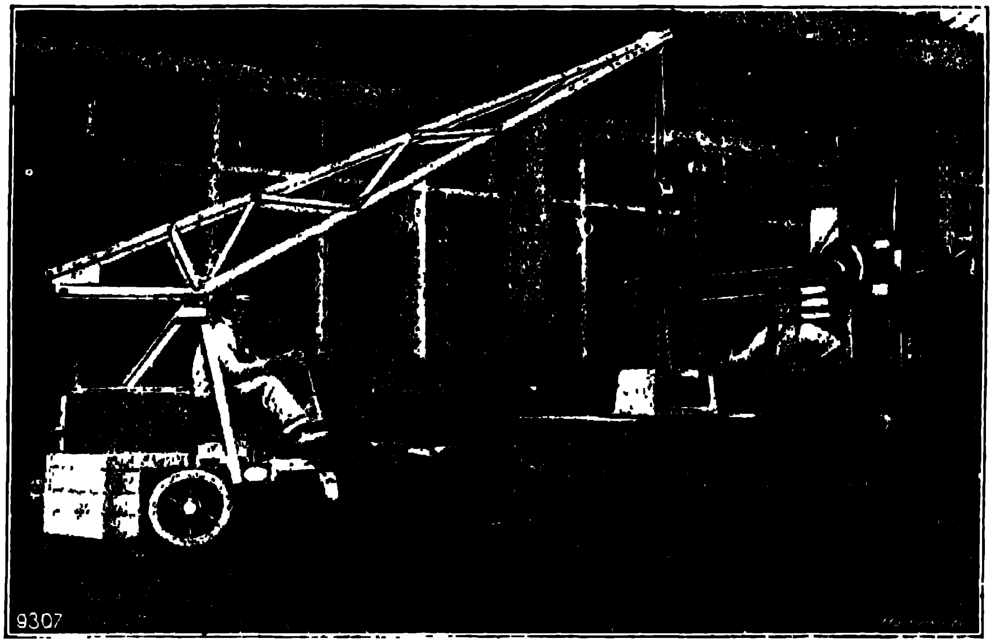
The frame consists of heavy castings especially suitable for rough handling. The Motor drives two wheels on roller bearings direct through a steel pinion for forward and reverse motions.

This method of transport we are sure will appeal to Mill Managers as the apparatus is always ready for use where electric power is available and goods can be delivered right into the godown without risk of fire or further handling which is a prime consideration in the busy season.

The illustration represents an installation recently completed on the Hooghly which has been most successful.

Standard 30 cwts. Jetty Crane with independent hoisting and slewing motion	**Rs. 9,750**
Standard 30 cwts. Jetty Crane with one motor for hoisting and slewing motion	**„ 8,950**
Electrically Driven Locomotive for loads up to 14 tons, speed 6|8 miles per hour	**„ 8,000**

We shall be pleased to furnish further particulars or quotations on request.



Electric Runabout Crane.

The "Ransome" Patent Runabout Crane made by Messrs. Ransomes, Sims and Jefferies, Ltd.

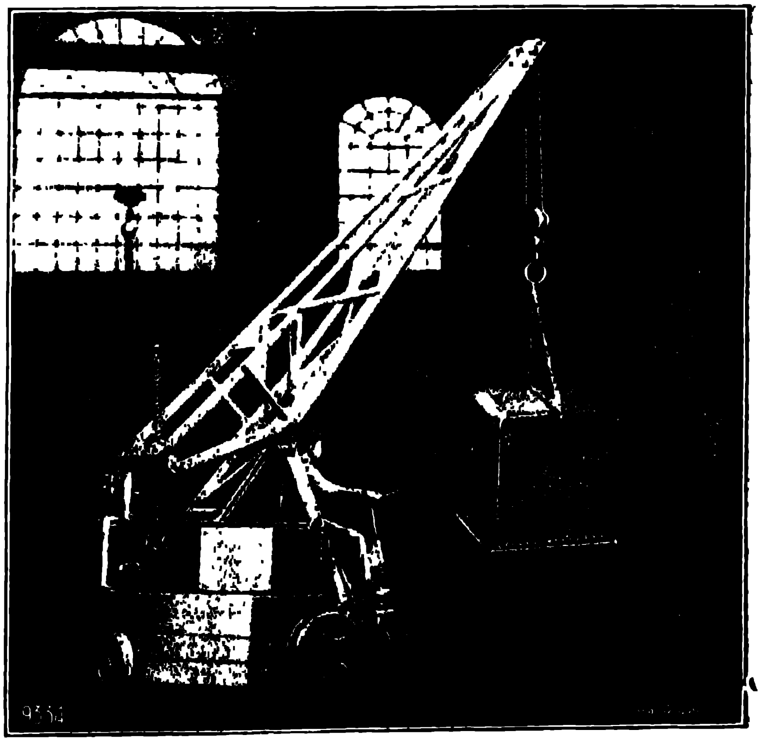
The characteristic features of this crane are, it can travel, turn, hoist and derrick under its own power. The Storage Battery which supplies current to the motors consists of 20 or 40 lead cells according to the voltage which may be either 40 or 80 volts. These are carried in two detachable boxes placed on the rear portion of the chassis and serve the additional purpose of balance weights.

All controls are manipulated by the driver from his seat, and as he has a clear view of the load, he can operate the crane simultaneously for travelling and hoisting, travelling and derricking, slewing and hoisting or slewing and derricking with perfect ease.

These Cranes are made for the following maximum capacities:—

7½ or 15 cwt.	.. Rs.	15,820
20 cwt.	.. "	16,350

Detailed Specification on application.



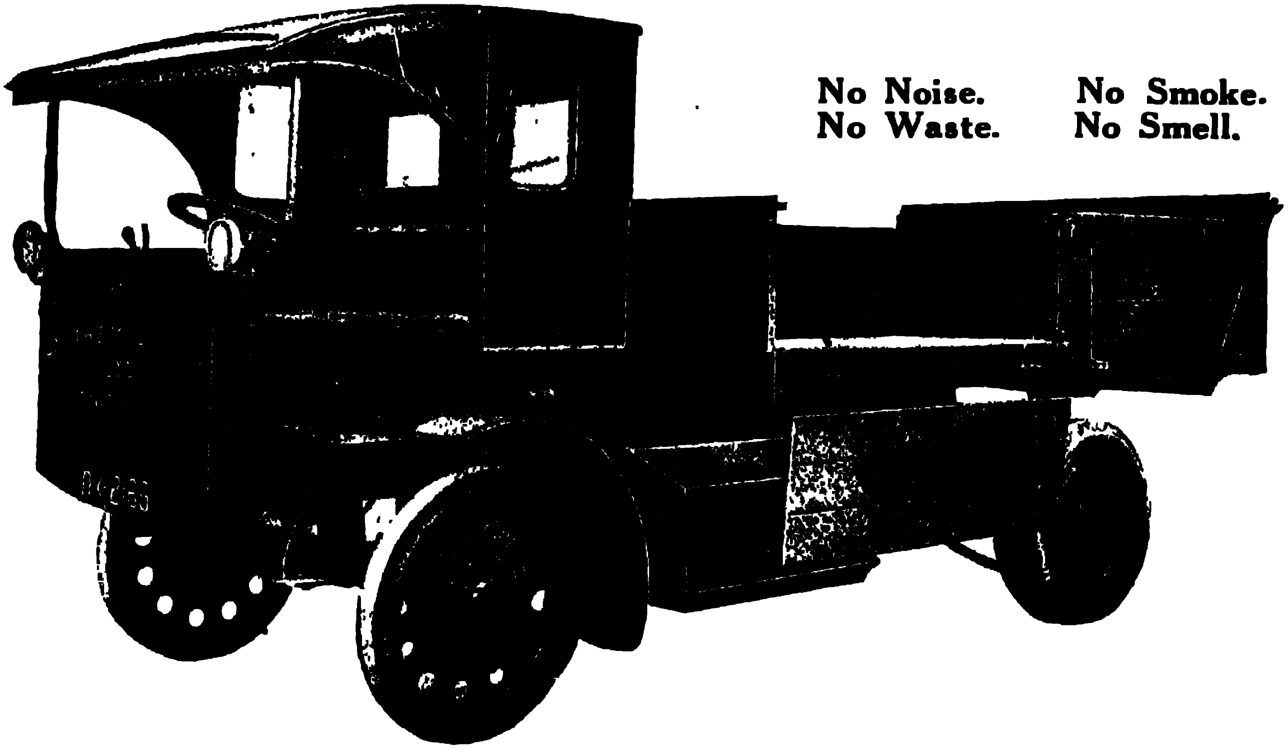
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Orwell" Electric Vehicles.

Ransomes, Sims & Jefferies, Ltd.
Orwell Works, Ipswich.



No Noise. No Smoke.
No Waste. No Smell.

Cheap Motive Power.—Electricity is now produced at very low cost in large generating stations in all the principal business centres. In using Ransomes' "Orwell" Electric Vehicles at least 60 to 70 per cent. of the energy put into the battery is applied to the road wheels, and no energy is consumed when the Vehicle is at a standstill, which is of the highest importance if the car, as is general in town service, requires to make frequent stoppages. Further, when going downhill, the regenerative control on the Vehicle enables an appreciable amount of energy to be restored to the battery.

Price.

Type	Chassis only with lead battery.	Chassis with battery and electric end tipping gear.	EXTRAS.		Cranes.
			Canopy.	Combined Volt and Amp. Meter.	
	Rs.	**Rs.**	**Rs.**	**Rs.**	Hand or Electric Cranes for loads of 5 to 20 cwt. can be fitted if desired.
MOFD 2/2½ Tons with IMV 8 battery of 258 A.H. Capacity	**16,200**	**18,400**	**320**	**280**	
MORD 2/2½ Tons with IMV 8 battery of 258 A.H Capacity ..	**17,100**	**19,300**	**320**	**280**	
MORD 3½/4 Tons with IMV 9 battery of 290 A.H Capacity ..	**19,800**	**22,100**	**320**	**280**	
MORD 4½/5 Tons with IMV 11 battery of 355 A.H. Capacity	**22,900**	**25,500**	**320**	**280**	

Descriptive matter and specifications on application.

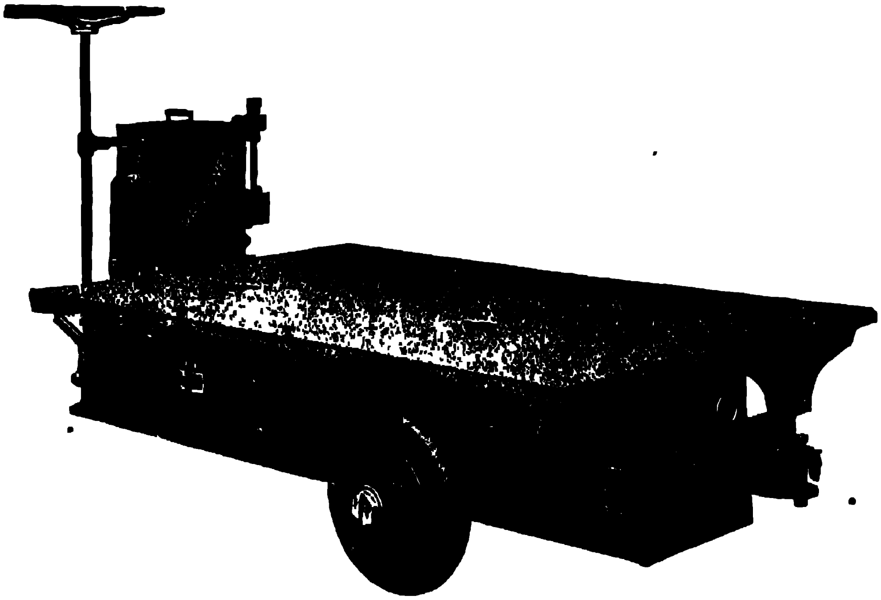
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

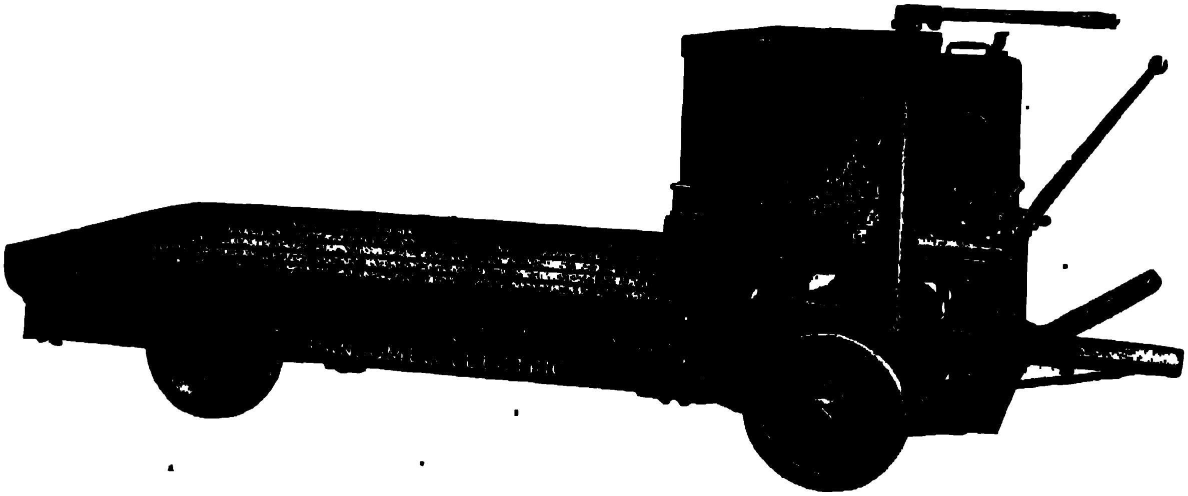
RANGOON, MADRAS,
BOMBAY, LONDON.

"Orwell" Electric Trucks.

Ransomes, Sims & Jefferies, Ltd.



Type.	B 1 with 3 wheels.	C with 4 wheels Non-elevating 2-wheel Steering.	C with 4 wheels Elevating 2-wheel Steering.	C with 4 wheels Non-elevating 4-wheel Steering.	C with 4 wheels Elevating 4-wheel Steering.	C with 4 16' wheels Non-elevating 2-wheel Steering.	C with 4 16" wheels Elevating 2-wheel Steering.	Tiering Truck 4000 lbs. 5 ft. lift 4-wheel Steering.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Standard Truck with lead battery ..	5,200	6,620	8,020	6,820	8,220	6,820	8,220	10,300
Amp.-hour Meter ..	300	300	300	300	300	300	300	300



'Orwell" Electric Trucks are now in service at the Calcutta Docks.

Write for descriptive matter and specifications.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Berry Transformers

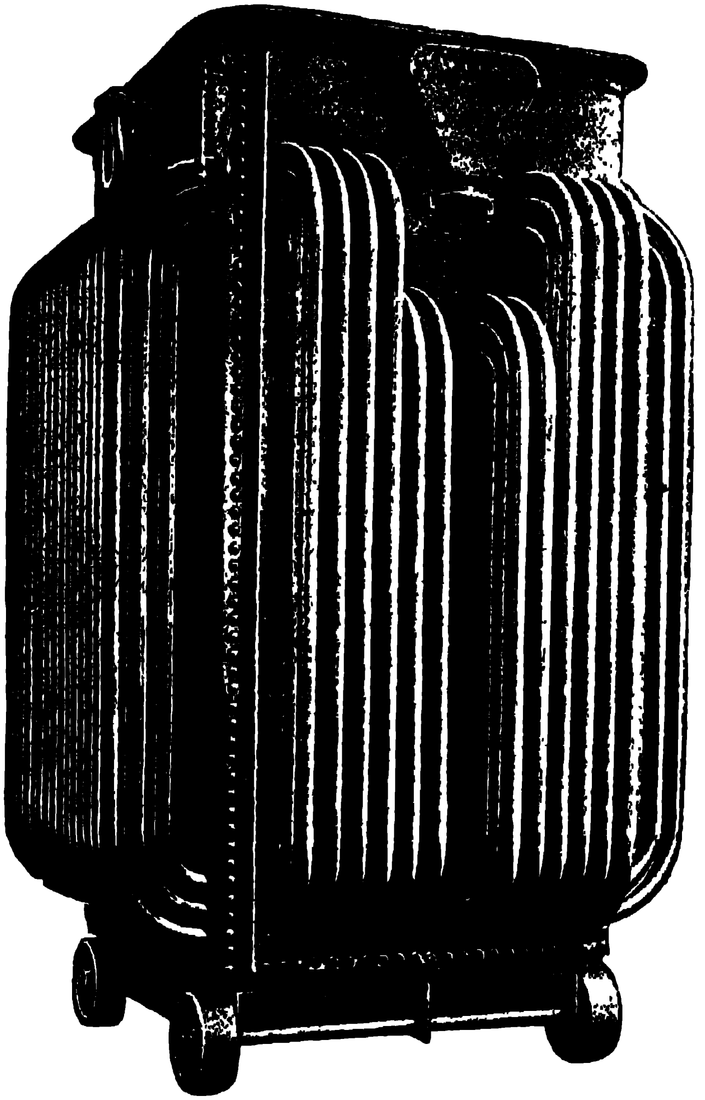
by the

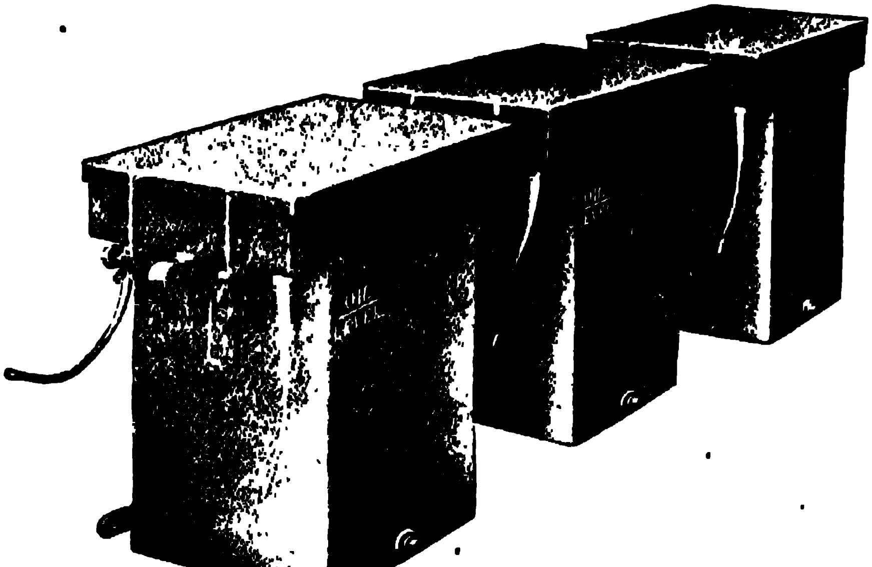
British Electric Transformer Co., Ltd.

Millions of horse power of these transformers have given unrivalled satisfaction all over the world, because their manufacture and design are based on over thirty years' continuous and ever-widening experience.

The electrical design of these transformers is in accordance with the very latest practice and its efficiencies and general performances will be found to compare well with those of transformers of any other make.

The mechanical design and construction has been based on two main considerations, accessibility of all parts for ease of repair, and the provision of sufficient rigidity in construction to withstand the electro magnetic forces arising in the transformer due to external short circuits.





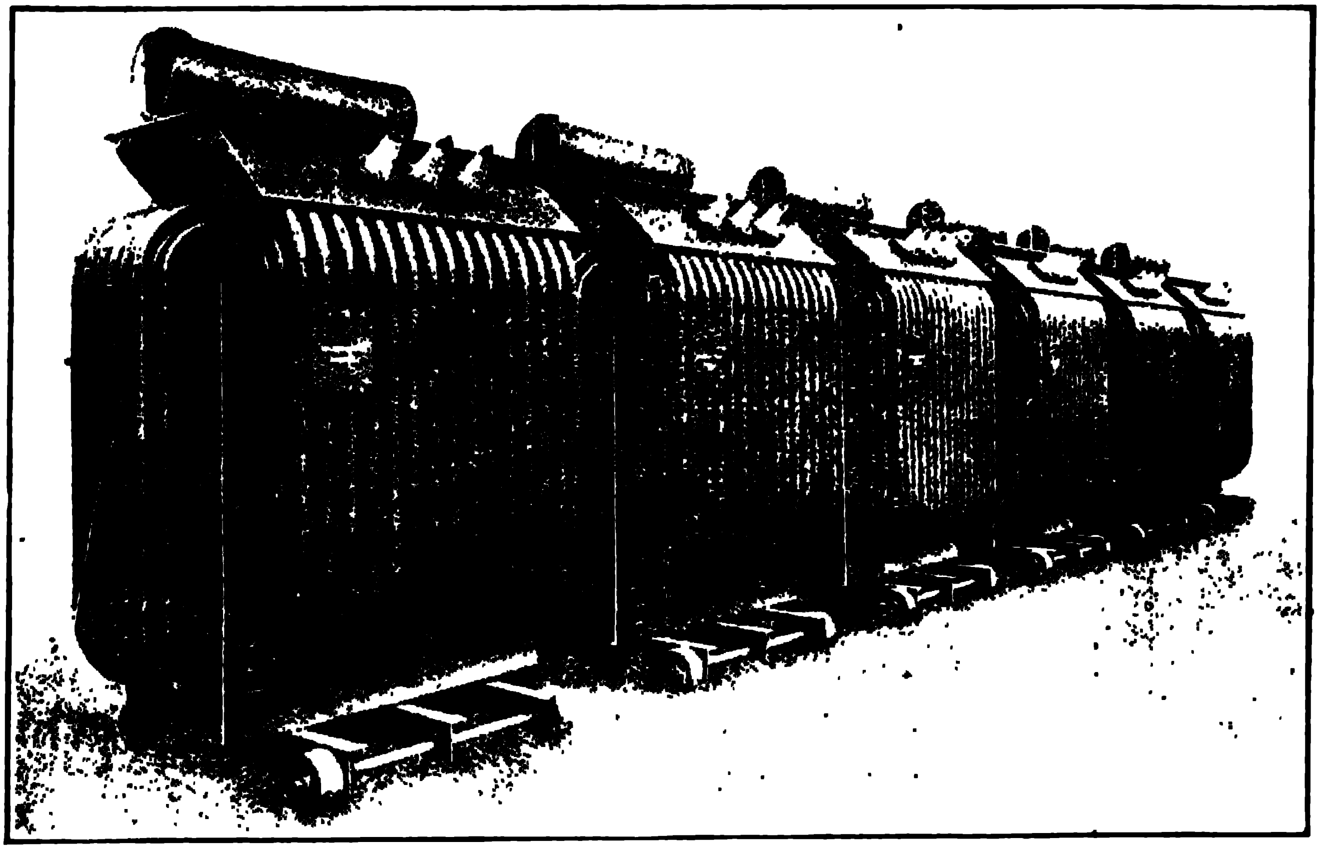
"Continuity of supply" depends very largely on the reliability of the transformers used, and more reliable transformers than the above are impossible to obtain.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Berry Transformers.



6-450 KVA 6000/400 Volts 3-Phase Transformers for the Calcutta Electric Supply Corporation, Ltd.

Enquiries.

We are prepared at all times to submit quotations for transformers of any capacity, any voltage and suitable for any duty. In order that we may save both time and trouble to our constituents we have given below a list of the information which is necessary in order that we may intelligently and expeditiously quote in accordance with our customers' requirements.

Output in KVA continuous.

High Pressure volts.

Low Pressure volts.

Number of phases.

Frequency of supply.

Maximum and minimum atmospheric temperature.

Location, *i.e.*, indoor, outdoor mining, etc.

Type of load, *i.e.*, lighting or power.

Is transformer to work parallel with other transformers? If so give the fullest particulars of same which is generally to be found on the nameplate thereof.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Transformer Price List.

The following prices are for Transformers of the "Berry" Core Type manufactured by the British Electrical Transformer Co.

Oil Immersed, Self-Cooled.

Suitable for use on a 50-Cycle 3-PHASE Supply.

All 50°C. Temperature Rise.

1101-3500 H. T. Volts to 1100 Maximum L. T. Volts.				3501-7000 H. T. Volts to 1100 Maximum L. T. Volts.			
KVA.	Price, Rs.	Gallons of Oil Required.	Approx. Effic. with full Load and Unity Power Factor.	KVA.	Price, Rs.	Gallons of Oil Required.	Approx. Effic. with full Load and Unity Power Factor.
2·5	**533**	8·0	·9380	5·0	**676**	10·0	·9487
5·0	**611**	10·0	·9523	7·5	**748**	12·5	·9560
7·5	**683**	12·5	·9584	10·0	**813**	15·0	·9610
10·0	**748**	15·0	·9632	12·5	**878**	17·5	·9636
12·5	**806**	17·5	·9652	15·0	**938**	20·0	·9655
15·0	**865**	20·0	·9671	17·5	**995**	22·5	·9668
17·5	**923**	22·5	·9681	20·0	**1,053**	25·0	·9680
20·0	**975**	25·0	·9692	25·0	**1,170**	30·0	·9695
25·0	**1,079**	30·0	·9705	30·0	**1,280**	35·0	·9711
30·0	**1,177**	35·0	·9717	35·0	**1,385**	40·0	·9723
35·0	**1,268**	40·0	·9730	40·0	**1,482**	45·0	·9731
40·0	**1,360**	45·0	·9737	45·0	**1,580**	50·0	·9738
45·0	**1,445**	50·0	·9743	50·0	**1,670**	55·0	·9744
50·0	**1,528**	55·0	·9750	60·0	**1,840**	65·0	·9755
60·0	**1,684**	65·0	·9760	70·0	**2,002**	75·0	·9766
70·0	**1,833**	75·0	·9771	80·0	**2,165**	85·0	·9776
80·0	**1,983**	85·0	·9780	90·0	**2,320**	95·0	·9784
90·0	**2,126**	95·0	·9788	100·0	**2,470**	105·0	·9791
100·0	**2,270**	105·0	·9795	125·0	**3,016**	125·0	·9802
125·0	**2,620**	120·0	·9805	150·0	**3,354**	142·0	·9810
150·0	**2,958**	135·0	·9813	175·0	**3,692**	162·0	·9816
175·0	**3,290**	155·0	·9819	200·0	**4,030**	180·0	·9820
200·0	**3,604**	170·0	·9823				

Extra for Tappings up to 3500 volts . . **Rs. 60-0**
" " " " " 7000 " . . . **Rs. 75-0**

Extra for Rollers, all listed sizes ... Rs. 65-0
" " suitable Oil, per gallon ... Rs. 4-4

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Radial Berry Transformer.

By The British Electric Transformer Co., Ltd.

Oil-Cooled Pole Type.

Suitable for use on a 50-Cycle Single-Phase Supply.

All 50°C. Temperature Rise.

KVA	Secondary voltage. min.	Secondary voltage. max.	3300 Primary Volts. Efficiency at ¼ load at unity. P.F.	3300 Primary Volts. Price, Rs.	6600 Primary Volts. Efficiency at ¾ load.	6600 Primary Volts. Price, Rs.	11000 Primary Volts. Efficiency at ¾ load at unity. P. F.	11000 Primary Volts. Price, Rs.	Gallons of oil required approx.
1	25	650	·9375	215			—		8
2·5	50	650	·9532	299	·9484	313	—		10
5	50	650	·9620	385	·9583	399	·9534	412	12
7·5	50 150	149 650	·9658 ·9668	441	·9626 ·9635	455	·9583 ·9594	483	15
10	50 250	249 650	·9698 ·9706	541	·9674 ·9681	555	·9624 ·9631	583	16
12·5	50 250	249 650	·9726 ·9733	598	·9699 ·9707	612	·9654 ·9662	640	17
15	65 300	299 650	·9738 ·9745	655	·9721 ·9729	669	·9684 ·9690	697	18
20	100 400	399 650	·9765 ·9769	765	·9742 ·9749	796	·9717 ·9724	838	24
25	100 500	499 650	·9774 ·9780	868	·9762 ·9767	896	·9739 ·9745	938	28
30	100 150 250	149 249 650	·9778 ·9782 ·9786	1,000	·9770 ·9774 ·9778	1,028	·9749 ·9752 ·9757	1,084	32
40	100 150 250	149 249 650	·9799 ·9801 ·9804	1,140	·9789 ·9792 ·9794	1,182	·9776 ·9779 ·9782	1,238	44
50	100 150 250	149 249 650	·9805 ·9811 ·9817	1,310	·9797 ·9803 ·9809	1,350	·9787 ·9793 9798	1,620	70

Table of Output Factors.

Temperature Rise °C.	50	45	40	35	30
Up to 10 KVA	1·0	1·03	1·06	1·10	1·15
11 to 25 KVA	1·0	1·04	1·07	1·12	1·20
26 to 50 KVA	1·0	1·06	1·10	1·16	1·25
51 to 250 KVA	1·0	1·08	1·13	1·20	1·30
Over 250 KVA	1·0	1·10	1·15	1·25	1·35

The KVA specified should be multiplied by the output factor according to size and the required temperature rise is indicated above and the resultant KVA will indicate the corresponding size of transformer rated at 50°C rise. The price, quantity of oil and shipping weights should be taken from the list for the increased size of transformer whilst the technical particulars can usually be taken as for specified size. Perhaps the following example will better illustrate this point.

Transformers specified 200 KVA, 50 periods, 6600-415 Volts, temperature rise 35°C in oil.

The output factor shown in the above list corresponding to 200 KVA and to 35°C temperature rise is 1·20 by which the specified output of 200 KVA is to be multiplied making an increased output of 240 KVA.

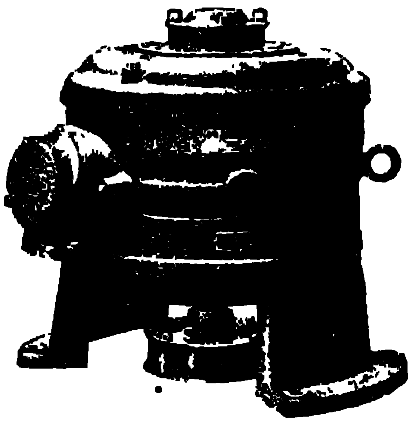
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Lancashire" Induction Motors
and
Direct Current Machines.

The motors are manufactured with the following types of enclosures.



Standard "Lancashire" Vertical Spindle S.C.R. Motor, also Centrifugal Clutch.

Protected.—A Protected Motor is one in which the internal rotating parts and live parts are protected mechanically from accidental or careless contact, while ventilation is not materially obstructed.

Enclosed Ventilated.—An Enclosed Ventilated Motor is one in which the ventilating openings in the frame are protected with wire screen, expanded metal or other suitable perforated covers having apertures not exceeding ½ square inch (3.2 sq. c.m.) in area, but not less than $\frac{1}{50}$ square inch (0.13 sq. c.m.) in area.

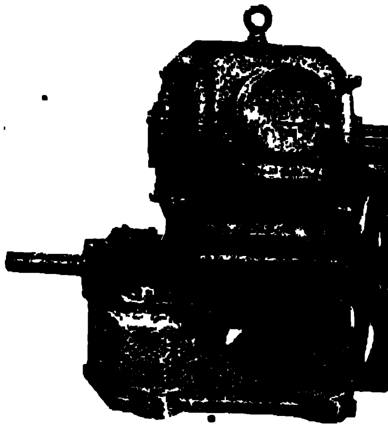
Motors having openings smaller than $\frac{1}{50}$ square inch (0.13 sq. c.m.) in area shall be regarded as Totally Enclosed Motors, as such openings frequently become clogged in actual service. They will comply with this specification when the motor is tested with the openings closed.

Totally Enclosed.—A Totally Enclosed Motor is one so enclosed as to prevent circulation of air between the inside and outside of the case, but not sufficiently to be termed "Airtight."

Pipe Ventilated.—A Pipe Ventilated Motor is an enclosed motor in which the frame is so arranged that the ventilating air may be conveyed to and/or from the motor through pipes or ducts attached to the frame, the ventilation being maintained by the fanning action produced by the motor itself, assisted or not by a fan or fans directly attached to the rotating parts.

Forced Draught.—A Forced Draught Motor is a pipe ventilated motor in which the ventilating air is supplied under pressure by means external to the motor itself.

Drip Proof.—A Drip Proof Motor is one having a frame provided with openings for ventilation so protected as to exclude falling water or dirt.



Standard "Lancashire" Under-Geared Totally Enclosed S.C R. Motor.

The following special types of motors are also supplied:

Vertical Spindle Motors.—These Motors are of wide application for many industrial processes. They are particularly suitable for driving vertical pumps, drills, and hydro-extractors, and may be used with advantage for many other classes of machinery where a horizontal spindle motor is not satisfactory.

Geared Motors.—Special attention is drawn to the back geared motor illustrated. A substantial casting is provided which carries the motor, and also carries bearings in which the second (slow motion) shaft runs. This construction is particularly rigid, and secures freedom from vibration. It will be found in practice to give very much more satisfactory service than any form of bracket supported by the motor frame.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Direct Current Generators.

Protected and Enclosed Ventilated Type Shunt Wound. All complete with Standard Belt Pulley Sliding Base and F. O. B. Shunt Regulator.

110-125 Volts.					220 Volts.					440 Volts.				
K.W.	R.P.M.	Pulley.	Size.	Price, Rs.	K.W.	R.P.M.	Pulley.	Size.	Price, Rs.	K.W.	R.P.M.	Pulley.	Size.	Price, Rs.
1	1240	4×3	241 AZ	390	1	1275	4×3	241 AZ	390	1	780	6×6	261 AZ	600
2¼	1100	6×6	261 AZ	600	1½	900	6×6	261 AZ	600	1½	1000	6×6	261 AZ	600
2¾	1000	6×6	271 AZ	697	2	1050	6×6	261 AZ	600	2	1160	6×6	261 AZ	600
4½	975	7×7	282 AZ	910	3	1150	6×6	271 AZ	697	3	1280	6×6	271 AZ	697
7¼	1050	7×7	292 AZ	1,080	5	1050	7×7	282 AZ	910	5	1220	7×7	282 AZ	910
6¼	780	12×7	6 A	1,115	8½	850	12×7	6 A	1,115	8	880	12×7	6 AZ	1,215
8¾	900	12×7	6 A	1,115	10½	1020	12×7	6 A	1,115	11½	1060	12×7	6 AZ	1,215
10¼	1060	12×7	6 A	1,115	14	1200	12×7	7 A	1,563	17	1250	12×7	7 AZ	1,365
12	920	12×7	7 A	1,563	16	800	14×8	7½ AZ	1,688	20	1140	14×8	7½ AZ	1,688
11¾	700	14×8	7½ A	1,580	20	1060	14×8	7½ AZ	1,688	21	910	15×10	8¼ AZ	1,978
15¾	860	14×8	7½ A	1,580	25½	930	15×10	8¼ A	1,833	26	830	15×10	9¼ AZ	2,268
19¾	780	15×10	8¼ A	1,833	22	630	15×10	9¼ A	2,148	31	740	18×12	10 A	2,700
18½	530	15×10	9¼ A	2,148	28	790	15×10	9¼ A	2,148	37	810	18×12	10 A	2,700
23	780	15×10	9¼ B	2,258	34	680	18×12	10 A	2,700	44	840	18×12	11 AZ	3,220
31	620	18×12	10 B	2,902	40	800	18×12	10 A	2,700	57	620	22×15	12¼ AZ	4,195
34½	720	18×12	10 B	2,902	46	820	18×12	11 AZ	3,220	64	670	22×15	12¼ AZ	4,195
36¼	640	18×12	11 B	3,172	67	680	22×15	12¼ BZ	4,420	75	780	22×15	12¼ AZ	4,195
48½	525	22×15	12¼ C	4,190	74	790	22×15	12¼ BZ	4,420	68	550	22×15	13¼ AZ	4,670
65½	680	22×15	12¼ C	4,190	60	510	22×15	13¼ BZ	4,895	80	620	22×15	13¼ AZ	4,700
45	400	22×15	13¼ C	4,650	70	590	22×15	13¼ BZ	4,895	93	720	22×15	13¼ AZ	4,700
61	500	22×15	13¼ C	4,650	79	670	22×15	13¼ BZ	4,895					
71	580	22×15	13¼ C	4,650	93	780	22×15	13¼ CZ	5,125					

Battery Charging Generators.

110 to 160 Volts.

K.W.	R·P·M.	Pulley.	Size.	Price, Rs.
2½	1300	6×6	261	655
3·1	1000	9×6	4	1 100
5·3	1000	9×6	5	1,160
6·6	1000	12×7	6	1,360

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Direct Current Motors.

Protected and Enclosed Ventilated Type Shunt Wound

All Complete with Sliding Base.

Standard Belt Pulley and Motor Starter.

220 VOLTS.						440 VOLTS.					
B.H.P.	R.P.M.	Pulley.	Size.	Price.		B.H.P.	R.P.M.	Pulley.	Size.	Price.	
				Rs.	A.					Rs.	A.
1	2300	3×3	226 AZ	242	0	1	2400	3×3	226 AZ	242	0
1*	1400	4×2½	236	356	0	2½	1900	4×3	241 AZ	410	0
2½	1850	4×3	241 AZ	410	0	5	1700	6×6	261 AZ	619	0
4*	1350	6×6	261	595	0	5*	1250	6×6	271	650	0
5	1650	6×6	261 AZ	619	0	7	1700	6×6	271 AZ	710	0
6*	1400	6×6	271	650	0	8*	1200	7×7	282	829	0
7	1650	6×6	271 AZ	710	0	10*	1050	8×8	292	1,070	0
8*	1150	7×7	282	829	0	10	1450	7×7	282 AZ	931	0
10*	1000	8×8	292	1,070	0	12	1250	8×8	292 AZ	1,127	0
10	1400	7×7	282 AZ	931	0	15*	960	12×7	6	1,185	0
12	1200	8×8	292 AZ	1,146	0	18	1150	12×7	6 AZ	1,273	0
12½*	850	12×7	6	1,200	0	20*	1100	12×7	7	1,395	0
17	1200	12×7	6 AZ	1,273	0	23	1320	12×7	7 AZ	1,458	0
21	1220	12×7	7 A	1,339	0	25	1460	12×7	7 AZ	1,458	0
25	1460	12×7	7 AZ	1,458	0	25*	930	14×8	7½	1,660	0
30	900	15×10	8¼ A	1,994	0	30*	1130	..	8¼	1,945	0
32	1200	14×8	7½ BZ	1,942	0	31	1130	14×8	7½ AZ	1,826	0
35	660	15×10	9¼ AZ	2,421	0	33	720	15×10	9¼ AZ	2,376	0
42	1080	15×10	8¼ AZ	2,257	0	38	1100	15×10	8¼ AZ	2,155	0
48	660	18×12	10 A	2,912	0	43	1000	15×10	9¼ AZ	2,532	0
65	960	18×12	10 BZ	3,506	0	45	700	18×12	10 A	2,912	0
57	700	18×12	11 AZ	3,504	0	53	910	18×12	10 AZ	3,284	0
83	570	22×15	12¼ B	4,335	0	61	880	18×12	11 AZ	3,539	0
76	420	22×15	13¼ BZ	5,254	0	71	520	22×15	12¼ AZ	4,413	0
88	490	22×15	13¼ BZ	5,254	0	85	460	22×15	13¼ AZ	5,034	0
100	560	22×15	13¼ B	4,797	0	100	530	22×15	13¼ AZ	5,034	0
						115	620	22×15	13¼ AZ	5,050	0

500 VOLTS.

B.H.P.	R.P.M.	Pulley.	Size.	Price.	
				Rs.	A.
15*	960	12×7	6	1,185	0
20*	760	14×8	7½	1,660	0
25*	900	14×8	7½	1,755	0
30*	930	15×10	8¼	2,108	0

* Motors in Stock for prompt delivery.

We shall be pleased to quote for D.C. Motors of any other Size and Voltage upon application.

The windings of all "Lancashire" Machines are specially impregnated to enable them to withstand tropical climates.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Alternating Current Motors.

Protected and Enclosed Ventilated Type. All complete with Standard Belt Pulley Sliding Base also Starter and all for 3-Phase 50-Cycle Supply.

SQUIRREL CAGE.							WOUND ROTOR.					
				Price.							Price.	
B.H.P.	R.P.M.	Pulley.	Size.	400 to 600 Volts Motor	Star Delta Starter.	Auto Transformer Starter.	B.H.P.	R.P.M.	Pulley.	Size.	400 to 600 Volts Motor.	Starters.
				Rs.	Rs.	Rs.					Rs.	Rs.
¾	700	4×4	E F	236	54	..	¾	700	4×4	E F	342	135 F. P.
1¼	700	4×4	G F	261	54	..	1¼	700	4×4	G F	376	135 „
2	1420	4×4	E F	236	54	..	2	1420	4×4	E F	342	135 „
2	700	6×6	H F	395	54	..	2	700	6×6	H F	537	135 „
3	1420	4×4	G F	261	54	..	3	1420	4×4	G F	376	135 „
5	1420	6×6	H F	395	54	..	5	1420	6×6	H F	537	141 „
7½	1420	6×6	J F	472	54	..	7	1420	6×6	J F	591	149 „
10*	1420	6×6	K F	537	150	..	9	1420	6×6	K F	656	189 „
15	1420	8×8	L F	672	150	450	12	710	9×6	AA 50	1,319	198 Drum.
15½	710	9×6	AA 50	957	150	463	14	1420	8×8	L F	845	206 F. P.
16*	930	6×6	AA 40	876	150	450	18	1420	10×8	M F	903	214 „
20	1420	10×8	M F	769	150	463	21	720	12×7	AA 60	1,561	440 Drum.
24	720	12×7	AA 60	1,244	150	475	25	1420	10×8	M F	903	245 F. P.
25*	1420	10×8	M F	769	150	475	29	720	12×7	AA 70	1,733	440 Drum,
25	950	12×12	AA 60	1,244	150	475	30	1420	..	AA 50	1,319	440 „
30*	950	12×12	AA 60	1,244	150	475	35	1430	12×7	AA 60	1,561	440 „
33	720	12×7	AA 70	1,331	319	610	38	720	15×10	AA 80	2,067	440 „
34	1420	9×6	AA 50	957	319	521	45	1440	12×7	AA 70	1,733	440 „
34*	950	12×12	AA 60	1,244	319	636	52	720	15×10	AA 90	2,216	602 „
42	1430	12×7	AA 60	1,244	319	636	60	1450	15×10	AA 90	2,216	602 „
44	720	15×10	AA 80	1,624	319	636	70	720	18×12	AA 100	2,734	602 „
52	1440	12×7	AA 70	1,331	446	687	80	1460	15×10	AA 90	2,216	602 „
60	720	15×10	AA 90	1,762	446	687	80	970	18×12	AA 100	2,734	602 „
67	1450	15×10	AA 80	1,624	446	834	90	720	18×12	AA 110	2,806	602 „
75*	720	12×7	AA 110	2,390	446	860	105	970	18×12	AA 110	2,806	874 „
80	720	18×12	AA 100	2,234	446	860	..	..	..	..	..	..
90	1460	15×10	AA 90	1,762	446	860	..	..	..	..	..	..
90	970	18×12	AA 100	2,234	446	860	..	..	..	..	..	..
100	720	18×12	AA 110	2,390	446	860	..	..	..	..	..	..
120	970	18×12	AA 110	2,390	446	999	..	..	..	..	..	..

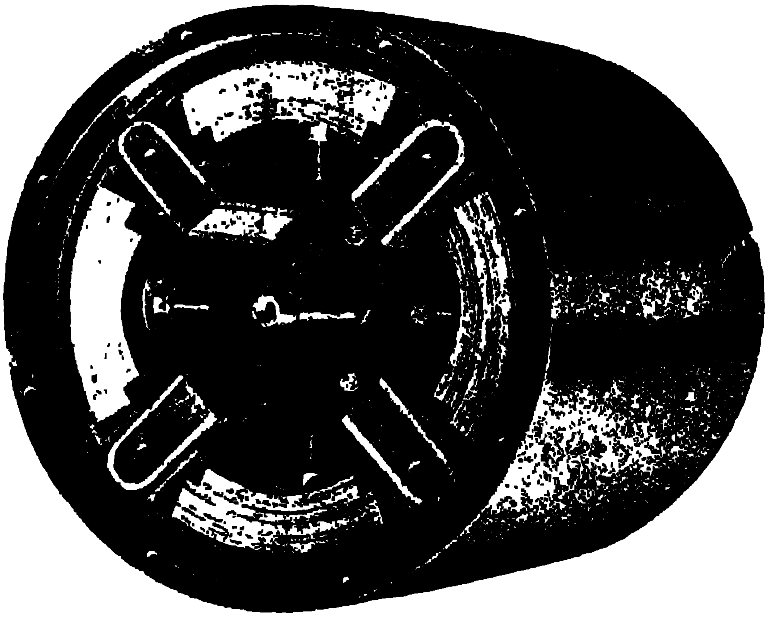
*Motors in stock for prompt delivery.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW.

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS, BOMBAY, LONDON.

Automatic Centrifugal Clutch Pulley or Coupling.



Internal Arrangement of Lancashire Automatic Centrifugal Clutch Pulley Dust-proof End-plate and Ring Removed.

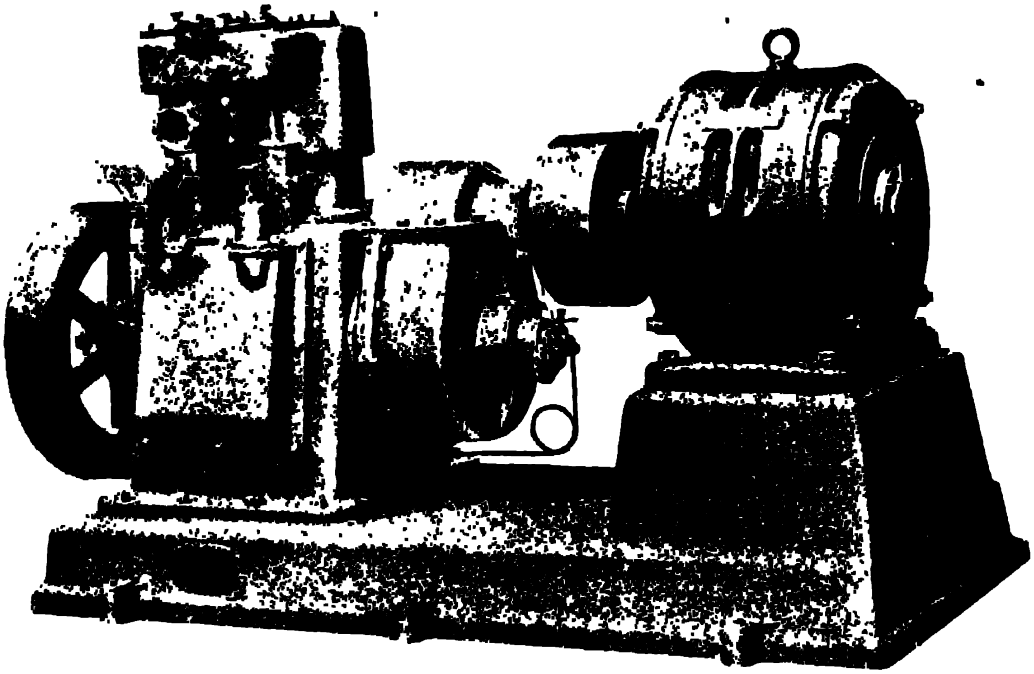
Application.

Cheapest and most Reliable Electric Drive.—The particular application for which this clutch has been perfected, is to facilitate the use of the simple, robust squirrel cage induction motor, in place of the more expensive slip ring motor, for constant speed drives. For many years the Lancashire Dynamo and Motor Company, Limited, have strongly advocated that the electric motor of the future will be the squirrel cage induction motor and in pursuing this policy, have devoted a great deal of time and thought to bringing the Lancashire Patent Squirrel Cage Motor to its present cheap and reliable form.

Having successfully accomplished the desired improvements in the motor, the Lancashire Patent Automatic Centrifugal Clutch was developed to overcome the sole objection to the use of the motor in its larger sizes, the objection being its comparatively low starting torque where a large starting current was not admissible.

Simple Switchgear.—An important advantage in connection with squirrel cage induction motor drive for large power units, is the comparatively simple switchgear which it is possible to employ, and there are numerous Lancashire Motor-and-Clutch power units of 100 B.H.P. and 150 B.H.P. installed where the starting switch is of the simple Star Delta type, oil immersed with automatic features.

Automatic Centrifugal Clutch.



Lancashire Squirrel Cage Motor, 40 B.H.P., Driving Air Compressor through Lancashire Automatic Centrifugal Clutch Coupling.

1. Wear on the frictional surfaces having no effect on the successful operation of the clutch, an extremely reliable and uniform action is maintained over prolonged periods.
2. Ability to operate though coated with dust or dirt. Absence of closely fitting parts which would jamb if dirty, or would not operate when slightly worn.
3. Nothing to go wrong; no levers or springs.
4. Slip occurs when overload takes place, a characteristic in contrast to that type of clutch which locks fast on overload and requires to be forcibly released.
5. Entire absence of jarring or chattering during the starting-up period.
6. The drive is through leather, eliminating the hammering action between metal to metal parts which causes the early destruction of so many clutches.
7. The shoes being formed with diverging ends, a maximum length of shoe face is obtained, with a corresponding large frictional area, and the stresses on the outer cylinder are distributed over the whole circumference.
8. The frictional surfaces of the shoes are faced with "Asbestos" Ferodo, the cheaper "Cotton" Ferodo never being used. Although it enables a cheaper clutch to be designed on account of its larger co-efficient of friction, "Cotton" Ferodo is quickly destroyed by heat.
9. Simple methods of adjustment to suit any condition of load, ensuring that the best possible results are obtained.
10. Facilities for inspection are greatly improved; only a few screws to remove for access to the interior.

For particulars and prices see next page.

These Clutches and Pulleys can only be supplied fitted to Lancashire Machines and are not sold separately.

Automatic Centrifugal Clutch. Type B.

Speeds and Powers.

Full Load Speed. R.P.M.	Working Brake Horse Powers.											
	No. 0.		No. 1.		No. 2.		No. 3.		No. 4.		No. 5.	
	Max.	Min.	Max.	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.	Min.
240									3¼	..	7½	2¼
330							3¾	..	8¾	2¾	20½	5½
360					2½	..	5	1¾	11½	3¾	27	8
385					3	..	6¾	2½	14¼	4¾	33	9
412					3½	2	7½	2¾	17½	6	40	12
460					5	2½	10½	4	24½	8	56	16
480					5¾	2¾	11¾	4½	28	9	64	18
495			2	1	6¼	3¼	13	5	31	10	70	20
575			3	1½	10	5¼	20	7	48½	16	110	32
690	2	1	5¼	2½	17½	6¾	34½	13	83	28	148*	54
720	2¼	1	6	2¾	20	10¼	40	15	95	32	153*	62
765	2¾	1¼	7¼	3½	23¾	13	47½	18	114	38	160*	74
865	4	1¾	10½	5	34½	17½	71	25	166	55	173*	107
960	5¾	2½	14¼	6¾	46¾	21	97	34	190*	75	..	..
1150	9	4¼	24½	11½	80¾	41	167	57	210*	129	..	..
1440	17½	8½	48	22¼	158	80	256*	110	..	.	..	..
1730	30	15	72*	39	..	..	..	..	..	..	..	..
2300	71	35	..	..	..	..	..	..	..	..	..	.
Clutch can be fitted to CRYPTO Machines ..	J.F., K.F.		L.F. to P.F.		..		..		..		..	
LANCASHIRE Machines ..	AA10		AA20 to 50		AA40 to 90		AA60 to 115		AA60 to 115		AA80 to 150	
Bore inches Minimum ..	⅞		1⅛		1½		2⅛		2⅛		2½	
„ , Maximum ..	1¼		1⅞		2½		3		3		4	
Standard Pulley dia. × face	7 × 6		8½ × 7		12 × 9		12 × 12		14¼ × 12		16¾ × 12	
Prices:												
Clutch Coupling Standard .. .. **Rs.**	**167**		**248**		**322**		**448**		**518**		**610**	
Clutch Pulley Standard .. .. **Rs.**	**167**		**248**		**322**		**448**		**518**		**610**	
Clutch Pulley Non-Standard .. .. **Rs.**	**184**		**270**		**357**		**495**		**575**		**680**	

Maximum Working B.H.P. is with fully loaded shoes (4 shoes).

Minimum Working B.H.P. is with shoes without any adjusting weights (4 shoes).

* These outputs have not the maximum number of weights, as otherwise mechanical stress in the rim would be too high.

The Maximum B.H.P. the Clutch is capable of transmitting is approximately 60 per cent. in excess of the tabulated Maximum or Minimum Working B.H.P., above which the Clutch will slip altogether.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

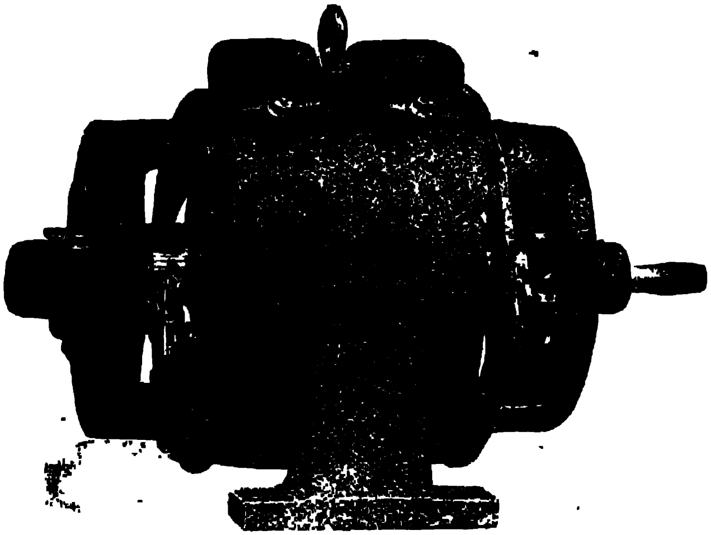
RANGOON, MADRAS, BOMBAY, LONDON.

Crypto Small Battery Charging Plant

by the

Lancashire Dynamo and Motor Co., Ltd.

Rotary Transformer For D. C. Mains.



In obtaining from the town's supply (D.C. Mains) a voltage suitable for battery charging it is most wasteful to insert resistance in the mains.

A Rotary Transformer reduces the voltage very efficiently, and gives reduced operating costs which save the initial cost of the transformer during the first few months' working.

Like the motor-generator on the opposite page—it has only two bearings, and the motor and generator armature windings are on the same core and shaft.

In the auto-connected sets (marked * in the Schedule), the two windings are electrically connected in a special manner to give an output current equal to the sum of the motor and generator currents—an arrangement which we do not generally recommend for supply voltages above 250.

In the other sets, the two windings are quite distinct.

The usual windings are 15, 30 and 50 Volts, these being very convenient for battery charging. Other voltages can be supplied, but the limits of generator current stated in the schedule must not be exceeded.

The Schedule below gives the outputs of the various standard sizes, together with the limits of supply voltage for which the Transformers are suitable.

When ordering, the actual supply voltage should be stated, also the desired output voltage.

D.C. OUTPUT

Frame Size.	Town's Supply D.C. Voltage.	WATTS. For input to output voltages of ratio. Any.	Up to 6 to 1.	Up to 3 to 1.	Limiting value of Generator. Voltage.	Current.	Approx. Speed.
	Volts.	Watts.	Watts	Watts.	Volts.	Amps.	R.P.M.
230	100/250	90	140†	220†	200	13	2000
226	100/550	180	250†	360†	550	22	2000
236	100/550	320	440†	620†	550	32 (or 50*)	1800
241	100/550	580	800†	1·1† K.W.	550	32 (or 50*)	1800
261	100/550	1·5 K.W.	1·9† K.W.	2·6† „	550	45 (or 100*)	1600
271	100/550	2·2 „	2·8† „	3·9† „	550	45 (or 100*)	1600
282	100/550	3·2 „	4·0† „	5·4† „	550	90 (or 125*)	1400
292	100/550	4·5 „	5·5† „	7·6† „	550	90 (or 125*)	1400
300	100/550	7·0 „	8·5† „	11·5† „	550	90 (or 125*)	1250

*** The amperes so marked are special, and an extra charge is made.**

† Transformers for outputs so marked have the two armature windings connected in a special manner to give an output current equal to the sum of the motor and generator currents.

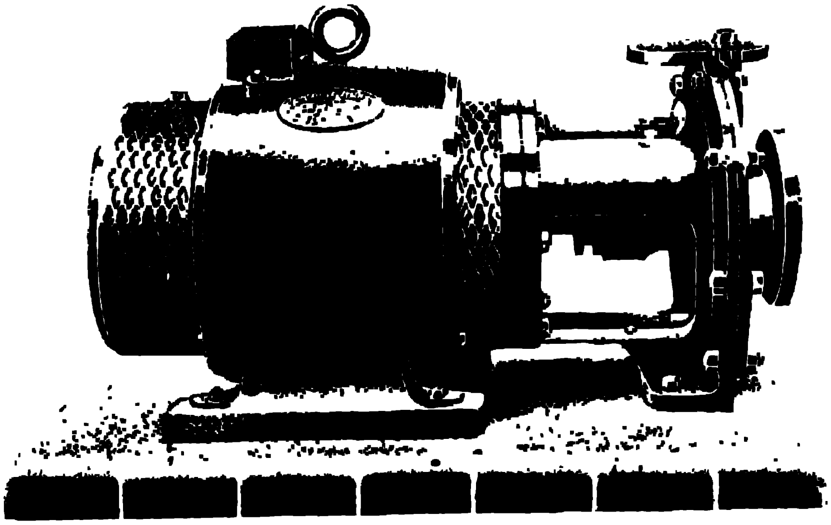
In other Transformers, the two windings are quite distinct, and the generator deals with the full output current. **Prices for above type also for A.C. Mains on application.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Phoenix Motor Driven House Service Pump.



Owing to the increasing demand for small electrically driven pumps for house service, garden irrigation, wells, and industrial purposes, we have designed the Phoenix Pumping Set to meet these requirements.

The Pump consists of four parts only, *i.e.*, Main Trunk Casting, Suction side endplate, Impeller, and Stuffing Gland.

Pump Capacities—for 110-220 and 440 Volt D.C. Standard 2½ B.H.P. Motors.

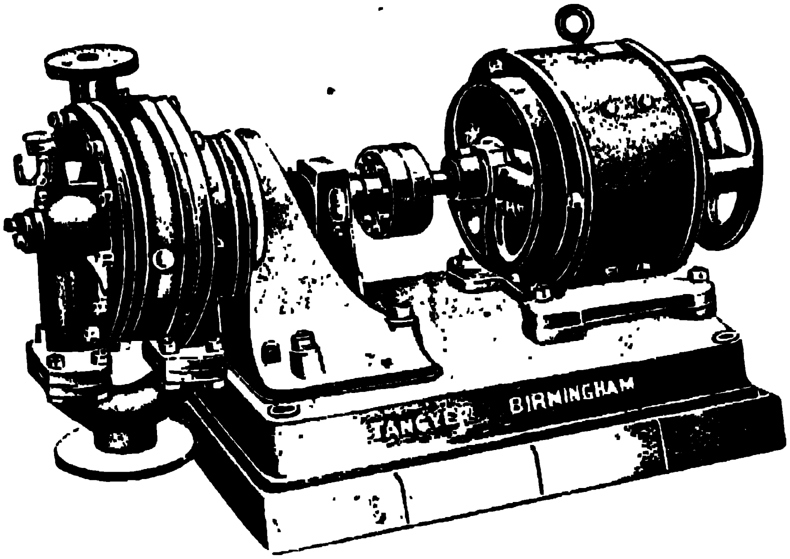
Series No. 1.		Series No. 2.		Series No. 3.		Series No. 4.		Series No. 5		Price.
Head Feet.	Gallons per hour.	Head Feet.	Gallons per hour.	Head Feet.	Gallons per hour.	Head Feet.	Gallons per hours	Head Feet.	Gallons per hour.	With Starter Complete
30	4,500	50	4,500	65	3,850	80	3,000	95	3,250	Rs. 735
35	4,500	55	4,300	70	3,350	85	3,500	100	3,000	
40	4,500	60	4,100	75	3,000	90	3,700	105	2,600	
45	4,500	..	..	..	..	..	..	..	..	

For A.C. 1,420 R.P.M. Motors. **For A.C. 2,800 R.P.M. Motors.**

Series No 6—5¾" imp.		Series No. 7—7" imp.		Series No 8—5¼" imp.		Price.
Head Feet	Gallons per hour.	Head Feet.	Gallons per hour.	Head Feet.	Gallons per hour.	With Starter Complete.
20	2,000	25	3,000	30	2,500	Rs. 705
25	1,750	30	3,000	40	2,500	
30	1,250	35	2,750	50	2,500	
....	....	40	2,500	60	2,500	
....	....	45	2,250	70	2,250	
....	....	50	2,000	80	2,000	
....	....	55	1,000	90	1,750	
....	....	....	....	100	1,500	

"Tan-Gyro" Motor-Driven Pump.

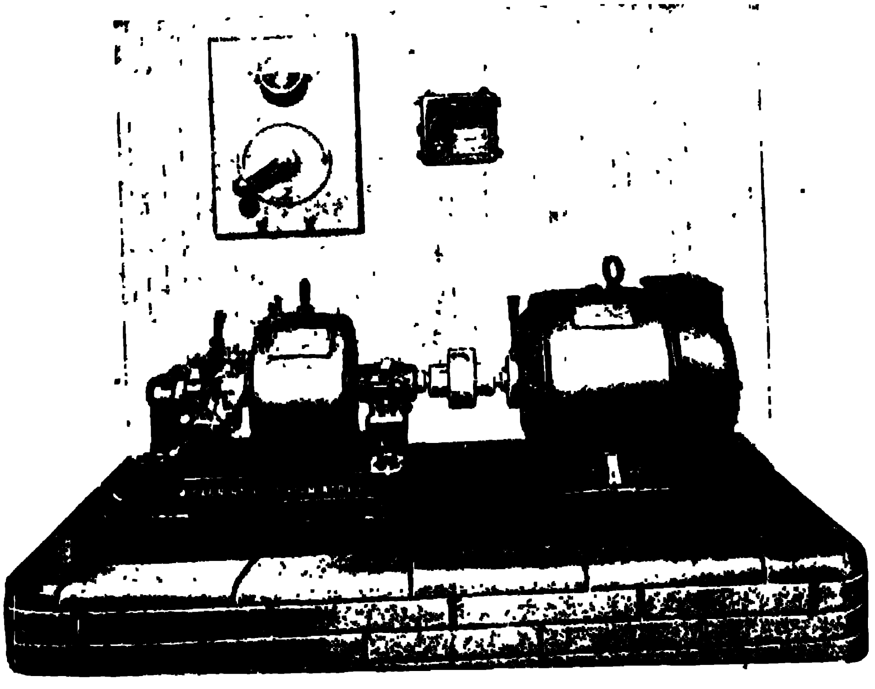
2 & 3-Inch Delivery Outlet.



The illustration shows a 2-inch diameter pump capable of delivering over 3,000 gallons per hour against 100 feet head. It may also be used in lifts up to 120 feet. The pump is driven through a flexible coupling by a Lancashire 220-volt shunt wound protected type motor and is supplied complete with a control panel, fitted with D. P. Switch and Fuses enclosed in a cast-iron case, with fool-proof interlocking arrangements, starter complete with no-volt and overload releases and shunt regulator.

Output in Gallons per hour.	Heads up to Feet.	Size Delivery Pipes.	Voltage.	H.P. of Motor.	Speed of Motor.	Price.	Extra for Control Panel.
					R. P. M.		
3,500	50		220	2·45	2,020	Rs 775	Rs. 120
4,000	75		220	3·85	2,450	820	„ 145
3,000	100		220	3·85	3,200	1,250	„ 145
8,000	35		220	3 00	1,150	1,050	„ 135
7,000	50		220	4·67	1,420	1,100	„ 165
8,500	75		220	7·70	1,760	1,140	„ 200
8,000	100		220	9·06	1,640	1,450	„ 215

"Canning" Motor-Driven Plating Generators.



These sets comprise a 220-Volt Motor direct coupled to a "Canning" Generator suitable for Silver, Nickel or Copper Plating on Metals, etc.

Complete with Starters and Voltage Regulators.

Motor			Generator.		Price, for Complete Set.
B.H.P.	Volts	Speed.	Volt.	Amperes.	
					Rs.
1	220	1900	6	50	1,150

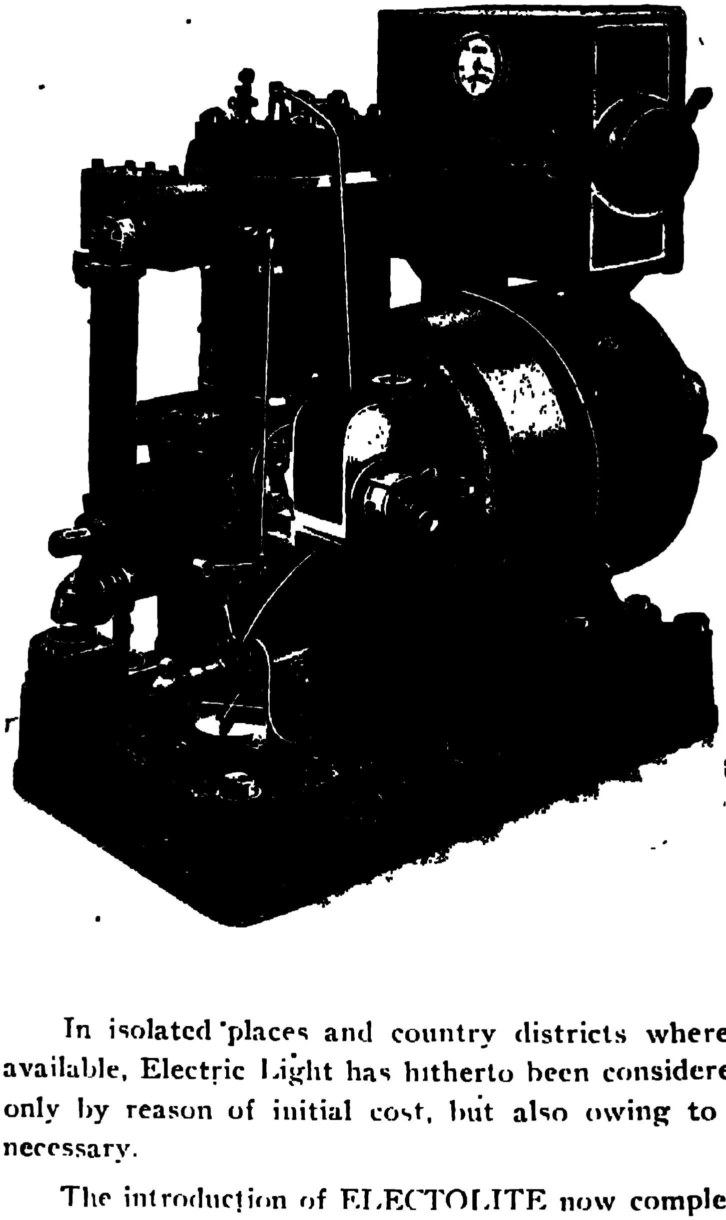
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Kerosene Generating Sets.

For Small Power and Bioscope Purposes.



The "Electolite"

Technical Specification.

Engine—Engine of four stroke cycle type, developing 3 B.H.P. at 1,000 R.P.M.

Generator—Generator is of the shunt reverse compound type with ball bearings. Output 1.5 K.W. at 70 volts 21.5 amps. 1,000 R.P.M. and 50 volts 21.5 amps. at lower speed.

Adaptability—(1) The battery can be charged when the lights are in use. (2) The dynamo can supply the lights direct without the battery. (3) Engine may be run independently: a belt pulley is fitted from which power may be transmitted to pump, saw, lathe or any machine within the capacity of a 3 H.P. engine.

Starting and Stopping—The plant is started by a simple movement of a switch and stops automatically when the battery is fully charged.

Fuel—Paraffin or Kerosene. 2¼ pints per hour when working at full load.

Price for Complete Set with Cooling and Fuel tanks, piping, etc. Rs. 2,200-0.

In isolated places and country districts where a central supply of electricity is not available, Electric Light has hitherto been considered an expensive luxury. Expensive, not only by reason of initial cost, but also owing to the maintenance and skilled attention necessary.

The introduction of ELECTOLITE now completely reverses these circumstances. The first cost is low. The current generated is cheaper than many town supplies. No attention is needed beyond that of filling the Kerosene and Oil Containers, and no intelligence is required beyond that of reading the indicator and turning a switch.

Also in Stock.

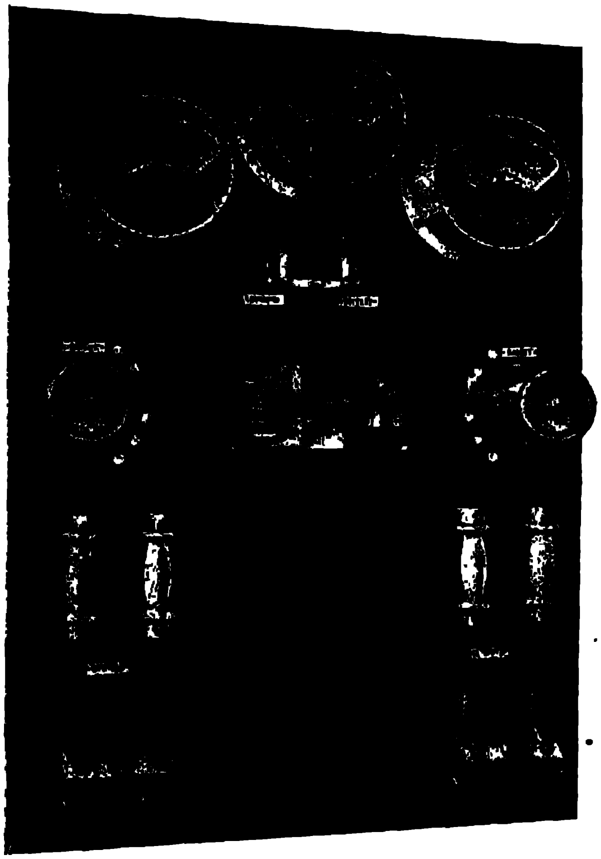
1—2 K.W. Steam Generating Sets (Sisson) 110 V. .. .. **Rs. 3,050-0**

Totally enclosed single crank 5 ins. by 3 ins. Stroke 100 lbs. pressure 4 B.H.P. at 900 P.M. All the above sets are without batteries.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW, JESSOP & Co. LTD ENGINEERS RANGOON, MADRAS, BOMBAY, LONDON.

Battery Charging Switchboards.

Standard Specification.



Enamelled Slate Panel, drilled for fixing and supplied with nickel-plated Corner Bolts, Insulating Bushes and Washers.

Two 6 in. Dial Dead Beat Moving Iron Ammeters, Iron Case, nickel-plated relief, to British Engineering Standards Committee, 1st Grade.

One ditto Voltmeter.

One 2-way D.P. Voltmeter Switch, with off-position.

One 6-way Charge and Discharge Switch, fitted with Auxiliary Arm and Resistance, one way being for direct running.

One D.P. Switch and Fuses for Dynamo.

One „ „ „ Lights.

One Automatic Cut-in and Cut-out.

Space for Shunt Regulator.

Complete with Copper Strip Back Connections and Sweating Sockets, and denoting labels.

Amps.	80 Volts. Price, Rs.	160 Volts. Price, Rs.	320 Volts. Price, Rs.	Approximate Size of Slab. Height. Width.	Approximate Nett. Weight.
20	378	396		34 × 24 ins.	90 lbs.
30	414	432	468	34 × 24 „	100 „
60	450	468	504	40 × 28 „	120 „
100	576	603	630	40 × 28 „	210 „

Extras.

Angle Iron Frame, **Rs. 36**; Moving Coil Meters, **Rs. 90**; Marble **(10 per cent. extra).**
Extra Ways, C & D Switch, 30 amps., **Rs. 3**; 60 amps., **Rs. 4-8**; 100 amps., **Rs. 9**; 200 amps., **Rs. 15.** Voltmeter Fuses, **Rs. 2.**
Pilot light Swan Neck Bracket, N.-P. Shell Reflector and Holder, **Rs. 10.**

Storage Batteries.

By the Hart Accumulator Co., Ltd., Stratford, London, E 15.

By Special Permission.

Storage Battery Contractors to H.M. The King-Emperor.

Battery of 116 Cells for Private Electric Lighting Installation.

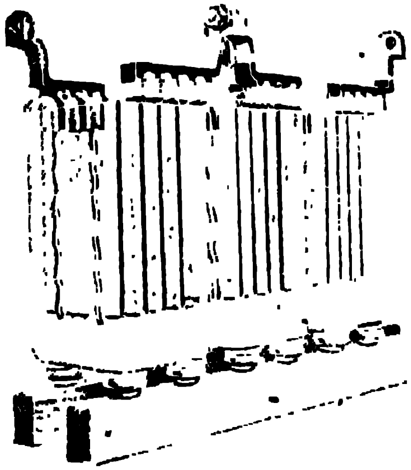
The Hart Accumulator Company manufactures every kind of Battery from those required for Submarines down to Batteries for Ignition and Radio work. Apart from Stationary Batteries they have had invaluable experience over the past 20 years with Train Lighting Batteries which work under such exacting conditions in India that the manufacture of them is specially modified to suit tropical conditions. This experience has been applied to Storage Batteries for Electric Lighting Installation, particulars and prices of which follow. If any of our customers require fuller information than is contained in this brief summary we shall be glad to send them an illustrated catalogue describing fully the various Batteries manufactured by this Company.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Hart Storage Batteries.



In Glass Boxes.

Suitable for small Electric Lighting Installations and General Purposes.

Prices per Cell and particulars of capacity, etc., of Batteries suitable for Lighting Installation.

The most popular number of Cells for this purpose is either 60 or 27 but any number of Cells can be supplied according to the voltage required

Type.	Discharging capacity at 10 hours rate	Normal charge rate.	Maximum charge rate	Gallons acid dilute 1,195 g. s	**Price,** per Cell.
					Rs.
HT	15	5	10	·6	**28-0**
HT	67	8	15	·75	**35-0**
HTX	81	9	18	·9	**38-8**
HT	90	10	20	·9	**41-0**
HT	112	13	25	1·16	**47-0**
HT	135	15	30	1·26	**52-8**
HT	157	18	35	1·41	**58-8**
CHG	174	24	40	1·8	**62-8**
HTX	189	21	42	2	**67-0**
HLL	207	18	36	2·3	**71-8**
NL	216	20	40	3	**76-0**
LL	252	24	48	2·9	**84-8**
HL	277	24	48	2·9	**92-8**
JNL	297	25	50	3·5	**98-8**

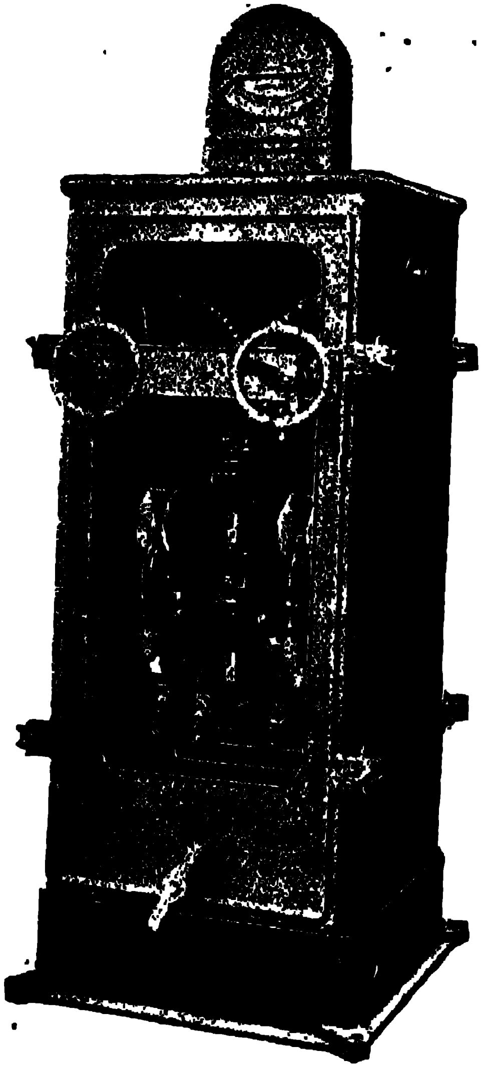
Glass boxes, patent non-corrosive terminals, insulators and all accessories are included in above prices.

Correct charging voltage=2.7×number of Cells in series.

Instruction cards and glass spares supplied with all batteries.

We can supply either Berk's B.A.A. English Acid or Indian Acid manufactured specially to the Hart Accumulator Company's analysis and owing to the high cost of importing English Acid, the Indian Acid will probably be preferred and can be safely recommended. **Price, Rs. 37-8** per case of 2 Jars containing nett 4½ gallons Sulphuric Acid of 1.840 S. G. packed for rail in Dog Kennel Cases.

Vauxhall Pillars.



Specification.

Floor Fixing Pillar Type Motor Control Panels, consisting of Sheet Steel Housing with cast-iron crown and base, hinged doors at back and front and external operating handles.

Each Pillar contains:—

Drum-type Isolating Switch, mechanically interlocked with front and back doors, so that the latter cannot be opened whilst the isolating switch is in the "ON" position, and the isolating switch cannot be closed while either door is open.

Two Single Pole Magnetically operated Circuit Breakers (contactors) fitted with No-Volt release and Overload release in each pole, fully interlocked with and actuated by the handle of:—

Vauxhall Starter, with roller contacts and one minute rated resistance consisting of either B.M.R. Enamelled Steel Tube Resistances or unbreakable grids. The resistance material is in all cases non-corrodible. The Starter embodies the well-known E.A.C. patent "Inching" feature which ensures that all current breaking is done on the contactors and never on the starter contacts.

The overload releases are operative at all times, and the combination of starter and contactors gives all the advantages of a loose handle circuit breaker, and moreover there is only one operating handwheel.

Shunt Regulator for variable speed machines interlocked with the contactors to ensure the motor starting under full field.

Push Button for stopping purposes.

All necessary interconnections and cable sockets, including terminals for use if distant "Stop" and "Inch" Buttons should be required at any time.

For industrial use the front door is glazed: for Mining Work and for Marine Use (if specified) sheet steel is fitted in place of glass.

The Field Regulator is mounted by the side of the starter in most cases. It consists of a cast-iron lever with laminated brush, easily adjustable for taking up wear. Button contacts are provided for the regulating steps, and a sector is fitted so that the spindle is not used for current carrying purposes. A simple electrical interlock is fitted to ensure the regulator being in the full field position before the motor can be started. At the same time this interlock obviates the automatic strengthening of the field on shutting down, which might result in the building up of a high voltage across the motor armature.

The regulator resistance is of the tube type, as described in connection with the starter, and is carefully stepped to give smooth speed variation.

The Contactors are fitted with powerful magnetic blowouts, and are of substantial design suitable for the heaviest duty. The operating coils form a no-volt release, and the overload releases, one of which is fitted in each pole, break the contactor coil circuit.

These overloads may be fitted with a time lag if desired.

The contactors are interlocked with and are actuated by the starter handle.

Instruments may be of the Moving Iron or Moving Coil type.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Vauxhall Pillars.

For use with all types of D. C. Motors, and suitable for all classes of starting duty.

H.P.	Volts.	Size.	CONSTANT SPEED.	VARIABLE SPEED. 50% Increase	 100% Increase.	 200% Increase.	Extra Price for Pedestal Moving Iron Ammeter.*
			Rs.	Rs.	Rs.	Rs.	Rs.
	100—125	10	485	575	655	685	94
	200—250	10					90
	400—500	10					90
7½	100—125	20B	675	760	850	870	100
	200—250	10	490	580	660	690	94
	400—500	10	490	580	660	690	90
10	100—125	20B	680	770	860	880	100
	200—250	10	495	590	670	700	94
	400—500	10	495	590	670	700	90
12½	100—125	20B	690	780	870	900	110
	200—250	10	500	600	680	730	100
	400—500	10	500	600	680	730	94
15	100—125	20B	695	790	880	910	110
	200—250	10	505	610	690	700	100
	400—500	10	505	610	690	700	94
20	100—125	30B	960	1,060	1,160	1,190	120
	200—250	20B	705	795	885	915	100
	400—500	20A	635	710	800	830	94
25	100—125	30B	975	1,075	1,175	1,205	120
	200—250	20B	720	805	895	925	110
	400—500	20A	635	725	815	845	100
30	100—125	30B	985	1,085	1,185	1,215	130
	200—250	20B	730	820	910	940	110
	400—500	20A	650	735	825	855	100
35	100—125	40B	1,280	1,380	1,500	1,540	130
	200—250	30B	905	1,000	1,100	1,130	120
	400—500	30A	815	905	1,005	1,035	110
40	100—125	40B	1,290	1,390	1,510	1,550	140
	200—250	30B	920	1,015	1,115	1,145	120
	400—500	30A	825	915	1,015	1,045	110
50	100—125	40B	1,300	1,400	1,520	1,560	150
	200—250	30B	1,035	1,135	1,235	1,265	120
	400—500	30A	845	940	1,040	1.070	110
60	200—250	30B	1,060	1,160	1,270	1,310	130
	400—500	30A	960	1,060	1,170	1,210	110
80	200—250	40A	1,370	1,460	1,580	1,620	140
	400—500	40B	1,210	1,310	1,430	1,470	120
100	200—250	40B	1,410	1,510	1,620	1,670	150
	400—500	40A	1,250	1,350	1,470	1,510	120
125	400—500	40A	1,300	1,400	1,530	1,570	130
150	400—500	40A	1,350	1,450	1,580	1,620	140

Size.	Extra for Sealing Boxes, each.	Extra for Interlocked Reversing Switch.
10	Rs. 35	Rs. 100
20A	„ 35	„ 110
20B	„ 45	„ 130
30A	„ 45	„ 150
30B	„ 50	„ 170
40A	„ 50	„ 200
40B	„ 60	„ 240

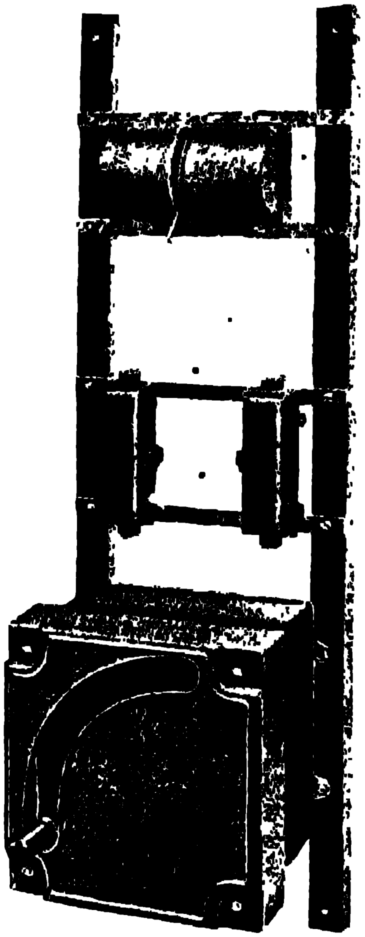
*For Moving Coil Ammeter, **Rs. 75** extra, any size.
or Spring Controlled Moving Iron Ammeter,
Rs. 15 extra, any size.
For Pedestal Moving Iron Voltmeter:

100/150	volts.	**Rs. 100**
200/300	„	„ **110**
400/600	„	„ **130**

For Moving Coil Voltmeter, **Rs. 75** extra, any size.
For Spring Controlled Moving Iron Voltmeter,
Rs. 15 extra, any size.
Extra for instruments inside housing **Rs. 60.**
Extra for Time Lags. **Rs. 60.**

Switchgear.

The Electrical Apparatus Company, Ltd.



Standard Panels.

For Direct Current Motors.

(Shunt or Compound Wound.)

H.P.	Price, 220 Volts.	Price, 440 Volts.	Extra for Regulator.	Extra for Ammeter.
	Rs.	Rs.	Rs.	Rs.
1	96	96	57	60
2	99	99	57	60
5	135	135	60	60
7½	143	143	60	62
10	174	149	62	63
12½	195	165	62	63
15	203	180	62	65
20	300	255	62	65
25	308	278	62	65
30	375	293	71	66
35	420	315	71	66

The above prices include Standard Panels consisting of Iron-Clad Switch, two Iron-Clad Fuse Boxes and Iron-Clad Motor Starter fitted with no-volt and overload releases. The whole connected up with V. I. R. cable and arranged on an angle iron framework for wall fixing.

Shunt field regulators giving 33 1/3% speed increase, also ammeters may be fitted at the extra price if required.

Prices for any size panel on application.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Standard D.C. Motor Starters.

The Electrical Apparatus Company, Ltd.

H.P.	VOLTS	SIZE	WITH NO-VOLT TYPE AND OVERLOAD RELEASES.					STANDARD RATINGS				
			Ventilated Resistance.			No Ventilation.						
			OPEN No Cover Over Slate.	S.E. Cover with Slot for Handle	H.O. Totally Enclosed Cover	T.E. Cast-Iron Totally Enclosed.	FLAME-PROOF. Machine Flanges	No-Volt Coils suitable for Shunt Current between. AMPS. Max	Min	Overload Release Calibration AMPS Min	Max	Approximate Full Load AMPS
			Rs.	Rs.	Rs.	Rs.						
½	100—125	00	21	24	32	36		·6	·3	7.5	15	6
	200—250	00						·4	·2	3·7	7·5	3
	400—500	00						·3	·15	2	4	1·2
1	100—125	00	22	25	33	37		·6	·3	12	24	10
	200—250	00						·4	·2	6·3	12	5
	400—500	00					The smallest Starter which can be made 'FLAME-PROOF' is our No. 1 size, hence minimum price up to 5 H.P. Rs. 180	·3	·15	2·8	5·6	2·3
2	100—125	00	25	28	35	40		·9	·45	24	48	19
	200—250	00						·6	·3	10	20	9
	100—500	00						·4	·2	5·5	11	4·3
3	100—125	00	27	30	37	42		1·6	·8	34	70	27
	200—250	00						·8	·4	16	32	13
	400—500	00						·4	·2	8	16	6·3
4	100—125	0	38	43	51	61		1·6	·8	44	88	35
	200—250	0	36	41	49	58		·8	·4	20	40	17
	400—500	0	36	41	49	58		·4	·2	10	20	8
5	100—125	0	39	44	52	62		1·8	·9	55	110	44
	200—250	0	38	43	51	61		1·0	·5	26	52	22
	400—500	0	38	43	51	61		·6	·3	12	24	10
7½	100—125	1x	60	69	81	117	„ 252	1·8	·9	75	150	63
	200—250	1	51	57	68	86	„ 195	1·0	·5	38	76	31
	400—500	1	51	57	68	86	„ 195	·7	·35	19	38	15
10	100—125	1x	81	90	102	138	„ 273	2·5	1·2	100	200	83
	200—250	1	55	61	72	90	„ 199	1·4	·7	50	100	41
	400—500	1	55	61	72	90	„ 199	·7	·35	24	48	19
12½	100—125	2	106	118	136	194	„ 374	3·0	1·5	120	240	97
	200—250	1x	72	81	93	129	„ 264	1·4	·7	60	120	48
	400—500	1	65	71	82	100	„ 208	1·0	·5	28	56	23
15	100—125	2	118	130	145	205	„ 385	3·5	1·7	150	300	120
	200—250	1x	85	94	106	142	„ 277	1·6	·8	75	150	60
	400—500	1x	85	94	106	142	„ 277	1·0	·5	36	72	29
20	100—125	2	148	160	176	236	„ 416	4·0	2·0	200	400	160
	200—250	2	106	118	136	194	„ 374	1·6	·8	100	200	80
	400—500	2	106	118	136	194	„ 374	1·2	·6	50	10	38
25	100—125	2	188	200	216	276	„ 456	4·0	2·0	250	500	200
	200—250	2	133	145	161	221	„ 401	2·0	1·0	125	250	100
	400—500	2	130	142	157	217	„ 397	1·3	·6	60	120	46
30	100—125	2	212	224	240	300	„ 480	4·5	2·2	285	570	235
	200—250	2	158	170	186	246	„ 426	2·2	1·1	145	290	117
	400—500	2	158	170	186	246	„ 426	1·5	·75	70	140	55
35	100—125	3	271	289	308	428	„ 645	4·8	2·4	350	700	280
	200—250	2	193	205	220	280	„ 460	2·4	1·2	175	350	140
	400—500	2	168	180	196	256	„ 436	2·0	1·0	·80	160	64
40	100—125	3	288	306	325	445	„ 661	5·0	2·5	390	780	310
	200—250	2	217	229	245	305	„ 485	2·1	1·2	195	390	155
	400—500	2	198	210	231	291	„ 471	2·4	1·2	95	190	73
50	200—250	3	247	265	285	400	„ 620	3·0	1·5	245	490	195
	400—500	3	247	265	285	400	„ 620	2·4	1·2	110	220	90
60	200—250	3	300	318	337	457	„ 673	4·0	2·0	290	580	234
	400—500	3	300	318	337	457	„ 673	2·4	1·2	135	270	108
75	200—250	[illegible]	320	337	397	589	„ 960	5·0	2·5	360	720	286
	400—500	[illegible]	320	337	397	589	„ 960	2·6	1·3	170	340	135
100	400—500	[illegible]	406	424	484	676	„ 1,056	3·0	1·5	220	440	178

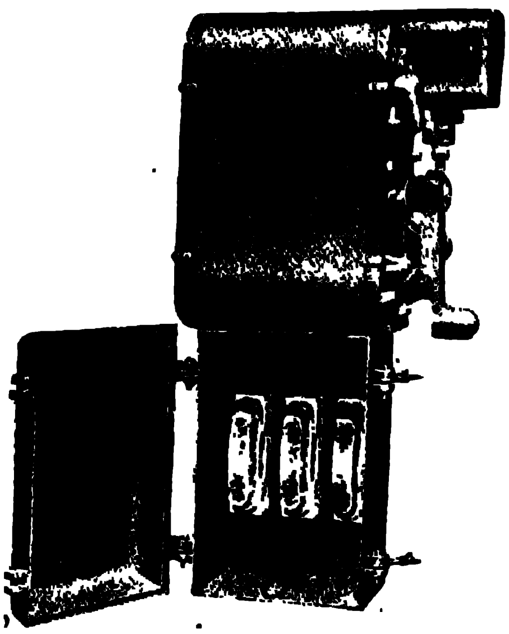
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Patent Drum-Type Starters for Squirrel Cage Motors.

Comprising
Star-Delta, Direct Starting or Reversing Switches for 3-Phase Circuits up to 650 Volts.



In every case the motor is completely disconnected from the line in the "Off" position, so that a separate main switch is not required.

The "Full On" cannot be reached without a pause in the starting position, but the handle does not remain in the latter when released.

Air-Break Starter with Fuses.

Oil Immersed Starter. (Can be made flame-proof.)

All the Starters are totally enclosed, and comply with the Home Office Rules.

The Air Break Form is fitted with a sheet-iron cover, and is not watertight.

The Oil Immersed Form can be made strictly watertight and is suitable for use in mines. At a small extra cost it can be made flame-proof, with broad machined metal to metal joints. The construction is very substantial and complies with all Mining Requirements.

In all cases the Insulation is of **Mica** throughout, and the **Contacts** are **Self-Aligning,** with **Coil Compression Springs that do not carry current,** and are **Renewable.**

Automatic Releases can be fitted.

Star-Delta Starters or Direct Starting Switches (Wall Mounting).

Size	Type	Oil required.	Amperes.	Maximum H.P. At 220V Below 35 ~	Maximum H.P. At 220V Above 35 ~	Maximum H.P. Above 380V Below 35 ~	Maximum H.P. Above 380V Above 35 ~	Non-Automatic	With No-volt Release.	With No-volt and 2 Overload Releases.	With No-volt and 3 Overload Releases	Extra for 3 Fuses.
		gals						Rs.	Rs.	Rs.	Rs.	Rs.
00	Air Break	—	50	15	20	10	30	70	102	165	180	48
10 Shallow	Oil immersed	2½	70	28	28	45	45	206	284	319	335	87
20	Oil immersed	7	125	50	50	100	100	328	412	446	462	87

Series Parallel or Reversing Switches (Wall Mounting).

00	Air Break	—	50	on application	80	112	180	Not fitted	48
10 Shallow	Oil immersed 3 wire	2½	70	....	225	300	338	„	48
10 Deep	„ „ 4 „	5	70	....	276	351	387	„	87
20	„ „ 3 „	7	125	...	330	414	450	„	87
30	„ „ 4 „	7	125	....	345	430	465	„	87

* Reversing Switches cannot be fitted with No-volt or Overload Releases.

Cable Outlets.—The above prices are for starters with plain holes suitable for conduit or open wiring. (If other sizes of hole than Standard are called for an extra charge is made.)

Fuses are Cut Out During Starting by the Direct Starting Switches only. Extra for arranging to cut out fuses during starting in all other cases 10 per cent. This cannot be done on Reversing Switches.

Combined Stator and Rotor Starters.

Iron Clad Airbreak Stator and Rotor Starters for 2 and 3-Phase Motors.

Maximum Volts, 650. Maximum Continuous Current, Size 00, 50 Amperes, Size XX, 125 Amperes.

[*N.B.*—If the motor is fitted with rotor short-circuiting device the rotor amperes may be increased up to 100 in the case of size 00.]

H.P.	Volts of Supply		Size	Non-automatic.	With No-volt Release.	With No-volt and 2 Over-load Releases.	With Fuses only.	With No-volt and Fuses.
	3-Phase	2-Phase		Rs.	Rs.	Rs.	Rs.	Rs.
	20—650	20—650	00	103	157	211	175	229
	30—650	25—650	00	106	160	214	178	232
	40—650	35—650	00	110	163	218	182	236
5	55—650	50—650	00	117	171	225	189	243
7½	84—650	75—650	00	126	180	234	198	252
10	110—650	100—650	00	135	189	243	207	261
12	140—650	120—650	00	142	196	250	214	268
15	170—650	150—650	00	153	207	261	225	279
20	170—650	150—650	XX	234	288	351	324	378
25	200—650	180—650	XX	252	306	369	342	396
30	240—650	220—650	XX	270	324	387	360	414

Specification.

These Starters are of Drum Type, with Moulded Mica Insulation. They comply with the Regulations of the Home Office and other authorities for Textile Mills and Factories. They are Totally Enclosed.

Contact Fingers are of the E.A.C. Registered Plunger Pattern, self-aligning, adjustable by means of nuts on a screwed stem, and provided with coil compression springs that do not carry current. Both fingers and drums are easily renewable.

Resistances are insulated with porcelain. They consist of our standard units wound on specially treated asbestos.

Automatic Trips and Spring Return. A Spring Return is fitted to all Sizes. Overload and No-voltage Releases are only operative when the switch is in the full-on position.

Stator Contacts control all Three Stator Leads of 3-phase circuits and the two outers only of 2-phase circuits.

Slow Motion is obtained by our Registered and Patented device—which ensures a definite stop at the right place—allows and induces a quick smart movement from stop to stop, and does not interfere with return from any point. There are five stops, *i.e.*, "off," 3 "starting," and "on."

Prices for Oil immersed units on application.

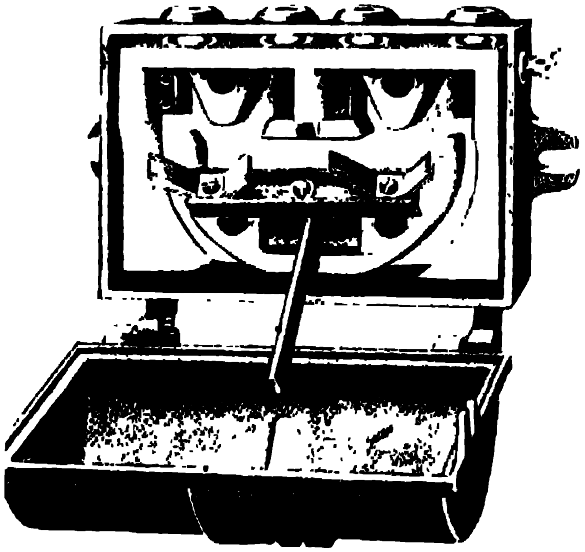
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

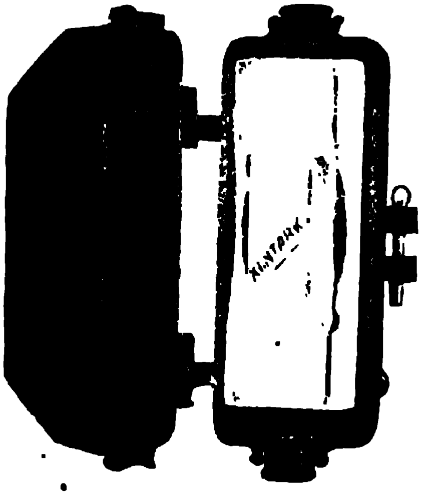
Iron Clad Switches.

Suitable for Circuits up to 250 Volts.



15 Amperes .. **Price, Rs 13-8** each.

House Service Type Iron Clad Fuses.



5 to 10 amperes capacity .. **Rs 2-8** each.
10 to 15 ,, ,, **,, 3-4** ,,

Branch Switches.

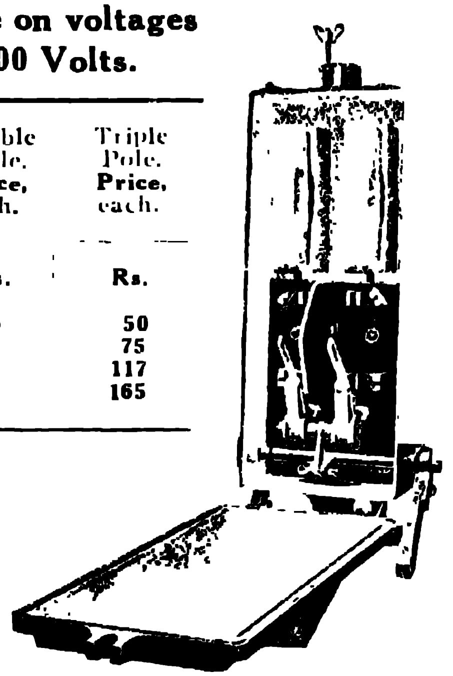
Weather-proof, Single-pole, Rotary Action

5 amperes, 250 volts .. .. **Rs. 7-0** each.
1[illegible] ,, ,, ... **,, 12-0 ,,**

Iron Clad Foolproof Switches and Fuses.

For Service on voltages up to 500 Volts.

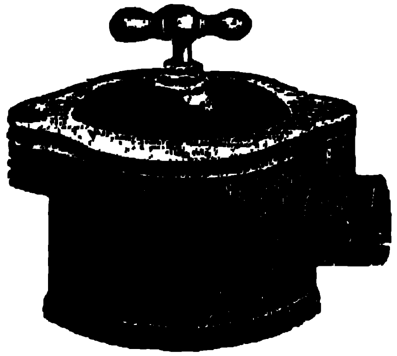
Capacity in Amps.	Double Pole. **Price,** each.	Triple Pole. **Price,** each.
	Rs.	**Rs.**
30	**36**	**50**
50	**50**	**75**
100	**80**	**117**
200	**113**	**165**



D. S.

600 Volt. Interlocked. Iron Clad Switch, Fuse and Plug Combined Colliery Type. Machine Joint Triple Pole.

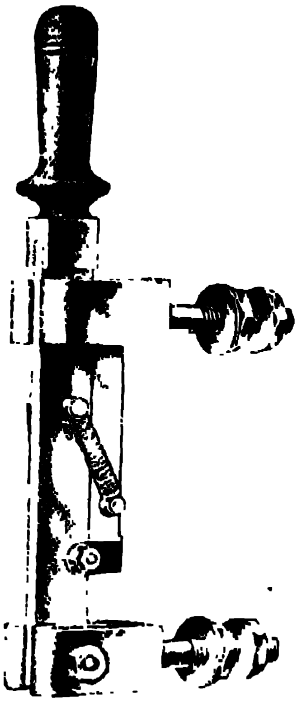
30 amperes .. **Rs. 230** each
50 ,, .. **,, 334** ,,



CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

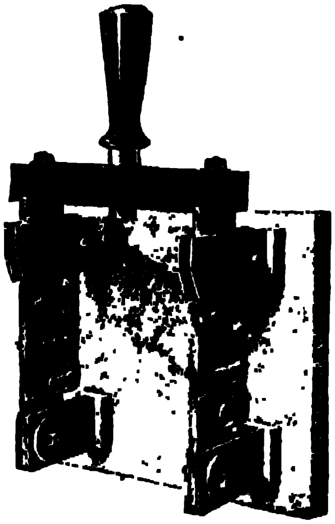
RANGOON, MADRAS,
BOMBAY, LONDON.



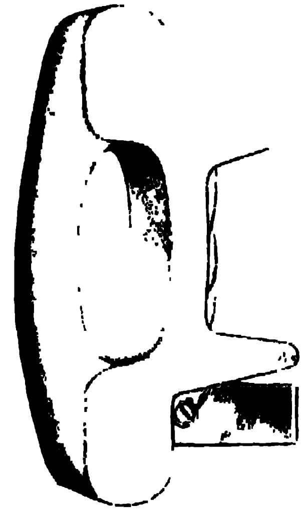
Knife Switches.

Rear connections. Quick Break. For Potentials not exceeding 600 Volts.

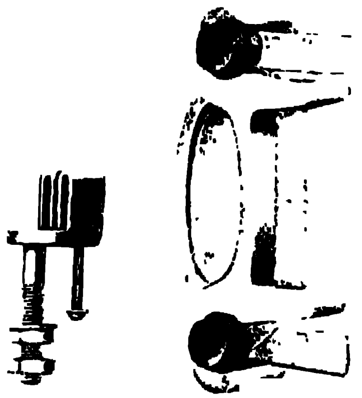
	Single Throw.	Throw Over.
	Double Pole.	Double Pole.
	Unmounted.	
Capacity.	**Price,** each.	**Price,** each.
30 Amps	**Rs. 10-0**	**Rs. 13-0**
60 ..	**„ 13-8**	**„ 18-8**
100 „	**„ 17-8**	**„ 23-0**
200 ..	**„ 29-0**	**„ 40-0**



Fuses for Switchboard Mountings. 600 Volts.



Hand Grip.



Thumb Grip.

Specification.

Handles of best English Porcelain, thumb grip pattern up to 60 ampéres capacity, above 60 amperes, hand grip pattern. Fuse wires enclosed in asbestos sleeves. Contact blades of hard drawn copper. Base clips of hard drawn copper fitted with independent fixing screw. These could be readily adapted for front connection if required.

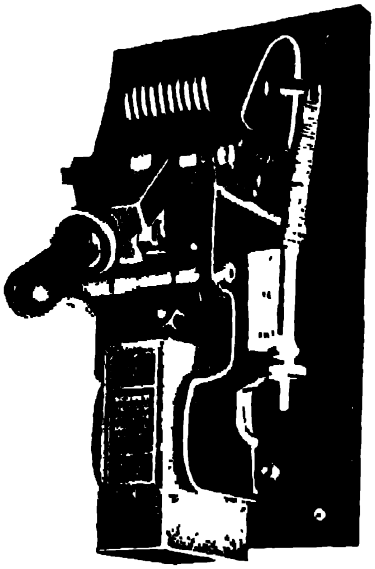
Carrying Capacity in Ampéres.	30	60	100	200
Price. each. Complete with Jaws.	**Rs 3-8**	**Rs 5-0**	**Rs. 8-8**	**Rs 14-0**

Thumb Fuses for Switchboard mounting 20 amperes 250 Volts, Complete with Jaws, Rs. 3-4 each.

Forged Copper Cable Sockets.

Made from high conductivity copper tube, tinned.

Ampéres.	15	30	60	100	200
Price, per Dozen .. **Rs.**	**1-4**	**2-0**	**3-0**	**5-0**	**12-0**

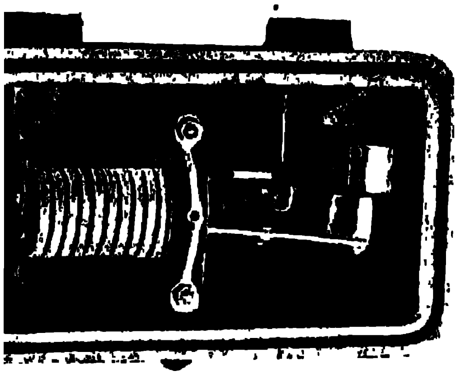


Circuit Breakers.

Record Electrical Co., Ltd.

Loose handle Type Circuit Breakers for voltages up to 700 for Direct Current only.

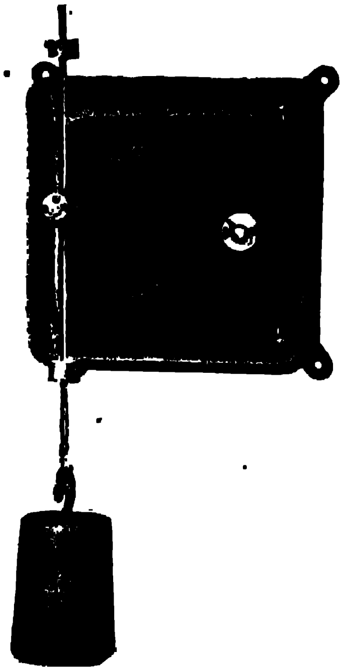
Nominal Capacity.	Single Pole.	Double Pole	No-volt Release	
			up to 250 volts	251 to 600 volts
Amperes.	Rs. As.	Rs. As.	Rs. As.	Rs. As.
30	79 0	165 0	50 0	62 8
50	82 0	172 0	50 0	62 8
80	85 0	179 0	50 0	62 8
100	89 0	186 8	50 0	62 8
150	119 0	250 0	50 0	62 8
200	120 0	252 8	50 0	62 8
300	175 0	367 8	50 0	62 8
400	182 0	383 0	50 0	62 8
500	225 0	472 8	68 12	81 4
600	250 0	525 0	68 12	81 4
800	300 0	630 0	68 12	81 4
1000	345 0	721 0	68 12	81 4



Automatic Cut-outs.

Record Patent Auto cut-in and cut-out for Charging Electric Accumulators.

Nominal charging current.	Up to 40 volts or 16 Cells.	Up to 80 volts or 32 Cells.	Up to 160 volts or 64 Cells.	Up to 320 volts or 128 Cells.
Amperes.	Rs. As.	Rs. As.	Rs. As.	Rs. As.
10	66 8	66 8	80 0	91 8
30	72 0	72 0	80 0	91 8
50	80 0	80 0	84 8	95 8
80	88 8	88 8	108 8	127 8
100	95 0	95 0	125 0	149 8
150	104 0	104 0	130 0	168 8
200	110 8	110 0	142 0	182 8



Float Switches.

Electrical Apparatus Co., Ltd.

Maximum Capacity 10 Amps. at 650 volts.

Suitable for starting A.C. Motors up to 5 H P.
" " " D.C. " " 3 H.P. Series wound.
" " " D.C. " " ½ H.P. Shunt wound.
Also for use with motors of greater Horse Power in conjunction with Auto Starters.

Single Pole **Rs. 44** each. Double Pole **Rs. 59** each. Triple Pole **Rs. 75** each.

Float Gear (Float, counterweight, 20 ft. Wire Rope, 2 Pulleys 2 stops) **Rs. 86** set.

"LeCarbone" Carbon Blocks and Pencils.

Size, Inches.	Type.	Price, per Block.
8×2×½	Link A	Rs. 5 8
11×4×1	„ C4	„ 30 0
11×4×1½	„ C2	„ 48 0
11×4×1½	„ A	„ 50 0
11×4×1½	„ B6	„ 36 0

9" long ×⅝" dia.	Rs. 1 2 each.
9" „ ×⅝" Square	„ 1 4 „

Fan Carbon Brushes.

⅜" dia. ×1¼" long ..	Rs. 5 4 doz.
⅜" „ ×1¼" Square ..	„ 6 8 „

Carbon Brushes for Motors.

Size, Inches.	Price	Size, Inches.	Price.
2¾×1¾×⅝	Rs. 4 0 each.	1⅛×⅝×½	Rs. 2 0 each.
1½×⅞×⅝	„ 2 10 „	1¾×1½×⅜	„ 2 8 „
2¾×1¾×½	„ 3 0 „	1½×1¼×⅜	„ 1 12 „
1¾×1¾×½	„ 2 8 „	1½×1×⅜	„ 1 10 „
1¾×1½×½	„ 2 10 „	1½×⅞×⅜	„ 2 2 „
1¼×1×½	„ 2 0 „	1½×1¼×¼	„ 1 12 „

Copper Braided Flexible Wire for Carbon Brushes.

³⁄₁₆" ..	Rs. 2 8	per doz. yds.
¼" ..	„ 4 12	„ „
⁵⁄₁₆" ..	„ 8 0	„ „

Carbon Brushes of Other Sizes made to Order.

Carbons for Arc Lamps.

Metal Cored Flame Carbons.

7 m/m×23½" long	Rs. 16-0 per 100
6-35 m/m×12" „	„ 8-0 „ „

Solid Carbons.

Size.	20 m/m×12"	18 m/m×12"	15 m/m×12"
Price, per 100 .. .. Rs.	34-0	30-0	18-0

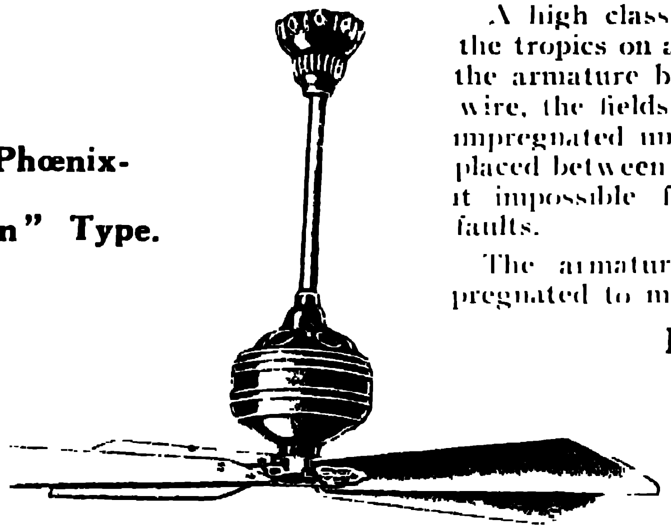
CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW.

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Phoenix" Electric Ceiling Fans.

"Phœnix-Saxon" Type.



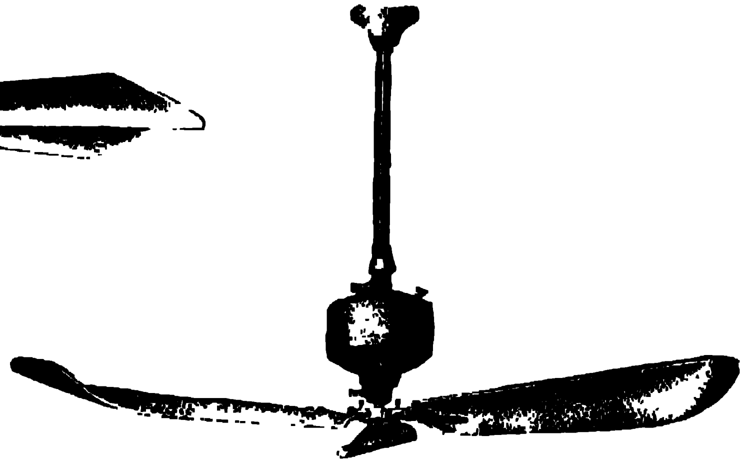
A high class, reliable Ceiling Fan, largely used in the tropics on account of its high insulation qualities, the armature being wound with double silk covered wire, the fields taped and braided and all thoroughly impregnated under vacuum. Thick mica sheaths are placed between the coils and the iron frames making it impossible for these to fail through insulation faults.

The armature and field coils are specially impregnated to meet Indian conditions

48 ins. Sweep, four wooden blades.
(For direct current.)

Price, 220 volts D.C. Rs. 106-0 each

Revo. D. C. Fans.



Revo. Fans Three Aluminium Blades.

	36" Sweep	54" Sweep
220 Volts D.C.	**Rs. 95**	**Rs. 110**
110 ,, ,,	,, **95**	,, **110**
50 ,, ,,	,, **95**	,, **110**

"Phœnix-Selco" Type D. C. Fans

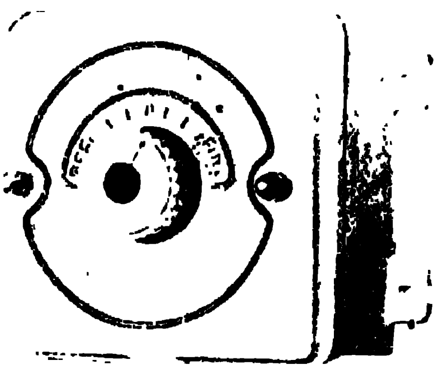
57 ins. Sweep, four wooden blades.	220 Volts D.C.	**Price, Rs. 130** each.
	110 ,, ,,	**,, ,, 125** ,,

Type Nos. 70 to 75. For Alternating Current.

Single Phase slow speed A. C. Fan for 50 cycles, 220 volts circuit. Finished in dull bronze Supplied with four well seasoned wooden blades, 48 ins. sweep insulated hanging hook, canopy standard down rod.

220 Volts, 48 ins Sweep, four wooden blades . **Rs. 150-0**

Regulators.



These are of neat and compact design; of the enclosed ventilated type allowing a free current of air to pass through the coils and carry off the heat. The coils are wound on slate and thus rendered non-inflammable. There are five steps and "off" position, which enable the fan to be regulated to a nicety, and the regulator is fitted with a cover to protect the live parts.

200 Watts	**Price, Rs. 20-0** each.
100	**,, ,, 16-0** ..

Carbon Pencils for making Fan Brushes 9 ins. long by 5/16 in. dia. .. .. **Re. 1-0** each.

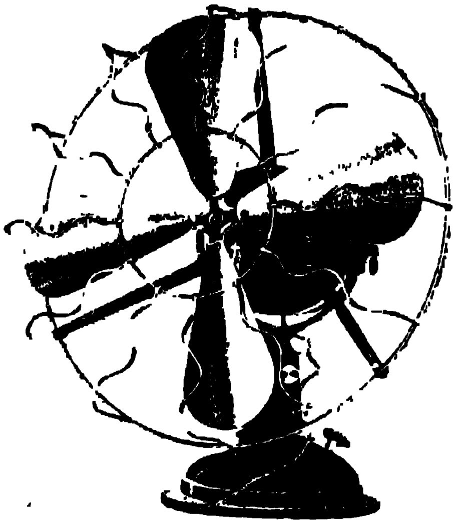
All sizes of Wire for repairing Armature and field coil winding can be supplied from stock.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Phoenix" Table Fans.



Fixed Type.

The Fan here illustrated can be thoroughly recommended for its working abilities and its excellent finish. It has a silk-covered wire-wound armature, 12 inches or 16 inches diameter blades and stage resistance, in base. It is excellently finished in black enamel. We stock 12 and 16 inches Fans for 50, 110 and 220 volts D.C., also 115 and 220 volts A. C. Single Phase, 50 Periodicity Circuits as below:—

Oscillating Type.

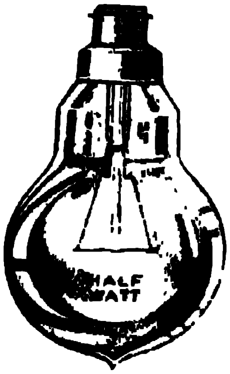
							Rs.
Stationary Type with	4 blades	16 ins dia. for	50/60 Volts, D.C.				83 each
..	..	4 ..	12 .	110	..			75 „
..	..	4 .	16 .	110	.			83 ..
..	..	4 ..	16 ..	220	..			88 ..
Oscillating	.	4 „	16 ..	110	..			107 ..
..	..	4 ..	16 ..	220	.			118 ..
Stationary	..	4 „	16 ..	110	.. A.C. 50 Cycles,	Single	Phase	96 „
..	..	4 ..	16 „	220	..	..	..	106 ..
Oscillating	..	4 „	16 ..	110	..	„	..	120 .,
..	„	4 ..	16 ..	220	.	..	..	136 „

"Phoenix ILG" Exhaust Fans.

The "Phoenix ILG" Self-cooled Exhaust Fan is the ideal air extractor for use in large offices, public buildings and warehouses. Its purpose is to keep a continual current of air passing through the place where installed, for which the ordinary ceiling fan is not suitable. We can strongly recommend the "Phoenix ILG" Fan for use where only scant attention can be given, as it is extremely well-made and the bearings are connected by a copper pipe so that both bearings are oiled from the front No danger, no chance to neglect the back bearing.

Voltage D. C.	220	110	110	110
Dia. Blades	12	18	24	30
Watts consumed per hour	70	110	275	440
Speed free air	1,400	1,000	800	700
C. ft. per minute	1,100	2,530	6,300	9,200
Price of Fan complete with Regulator .. Rs.	**98**	**190**	**356**	**540**

Half-Watt Lamps.



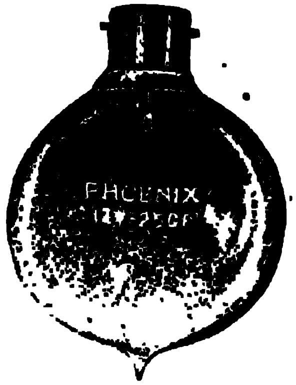
Voltage.	Watts.	Approx. Candle-power.	Cap.	Price. each. Rs.	A.
110			Bayonet	1	6
50, 110 and 225	40	50		1	9
110 and 225	60	80		1	13
50, 110 and 225	100	200		2	8
110 and 225	200	400	Screw	4	8
110 and 225	300	600		6	8
110 and 225	500	1,000		9	0
110 and 225	750	1,500		11	4
110 and 225	1,500	3,000		14	8

"Phoenix" Metal Filament Lamps.

The "Phœnix" Wire-drawn Metallic Filament Lamp has been in general use for a considerable time and can be confidently recommended where low current consumption and long life are considerations. The Filament is specially suspended in the lamp to prevent the possibility of breakage due to vibration. The candle-power of the lamp is practically constant throughout the life of the lamp.

Voltage.	Type.	Candle-power.	Price, per doz. Rs. A.
50 65	Pear Shape.	16 25 25	12 0
110	Pear Shape.	16 25 32 50	12 0
220	Pear Shape.	16 25 32 50	12 0

Contact Lamps for Motor Cars.



Volts.	C.-P.	Watts per C.-P.	Price, each. Rs. A.
3 5	2	1	1 0
4	4	1	
4	8	1	
6	3	1	
6	4·5	1	
6	6	1	
6	12	1	1 8
6	18	1	
6	24	1	
12	12	..	

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Twisted Flame Metal Filament Lamp.

Voltage.	Candle-power.	Cap.	Price, each.
			Rs. A.
110	20	Miniature Bayonet	2 12
110	20	Standard Bayonet..	3 4
225	20	Miniature Bayonet	3 4
225	20	Standard Bayonet..	3 8

Carbon Filament Lamps.

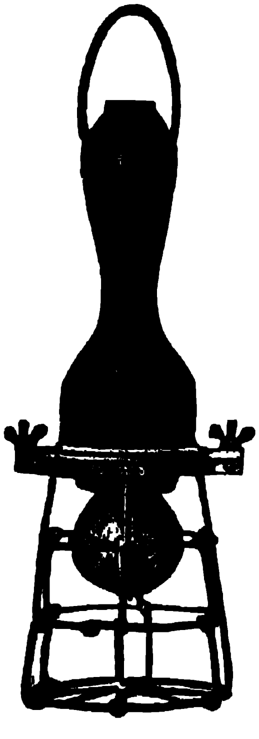
Voltage.	Candle-power.	Price, dozen.
		Rs. A.
110	16	12 8
110	32	16 0
220	16	12 8
220	32	16 0

Shadolite.

Colouring Lacquer for Lamps.

Red	Rs. 40-0 per gallon.
Blue, Green and Amber	34-0

Fig. 1.



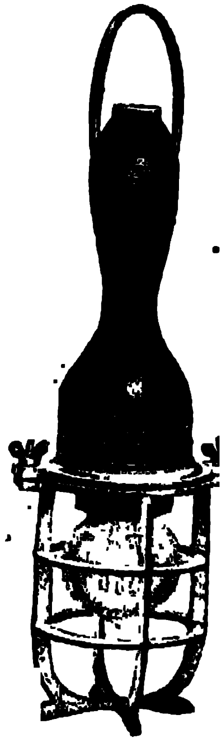
1974 W

Hand Lamps.

For Mills, Collieries and Workshops, Etc.

Fig. No.	Description.	Price. Each.	Price. Dozen.
		Rs. A.	Rs. A.
1	Hand Lamp with Galvanized Wire Guard and fitted with holder ..	7 0	80 0
2	Hand Lamp with Aluminium Guard cast in one piece, fitted with holder	8 0	91 0
	"The Empire" Hand Lamp, cheap type with Galvanized Wire Guard and fitted with holder. Similar to 1974 W	4 0	45 0

Fig. 2.



1974 A

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Ship's Saloon Fittings and Cargo Clusters.

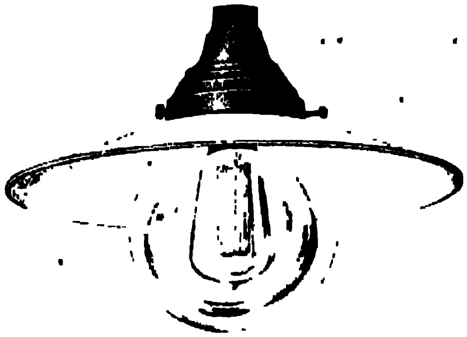


Fig C 2291
Price, each, Rs. 8-8.

Street Lighting Fittings.

50 Candle-power.

Half-Watt and M. F. Lamps.

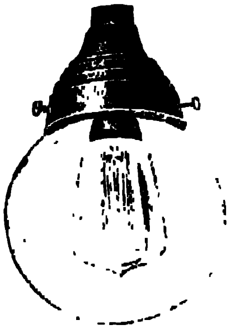
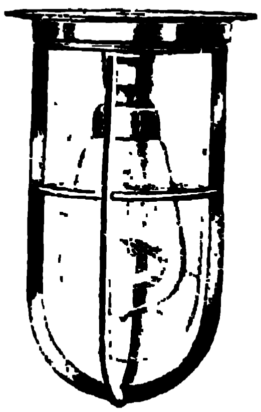


Fig C 2290.
Price, each, Rs. 4-4

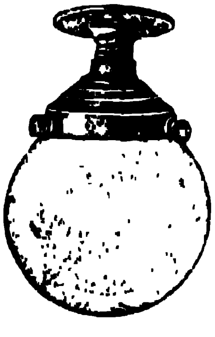
Brass, Ship's Saloon Fittings.

No C 1984



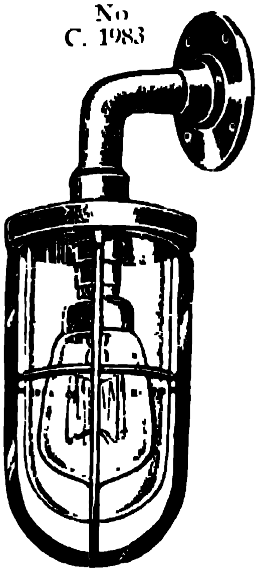
Price, each Rs. 5-8.

No C 1774.



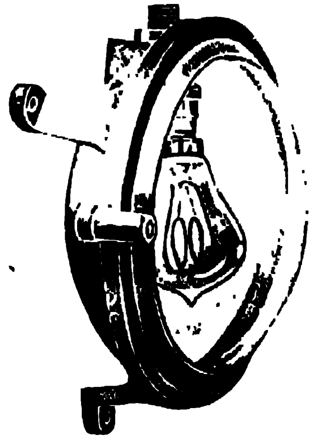
Price, each, Rs. 13-0.

No C. 1983



Price, each, Rs. 7-0.

Cast-Iron Bulk-head Fitting.



Price, each, Rs. 10-8.

Cargo Clusters.

¾ inch Nipples for 4 to 6
Lamps at option.

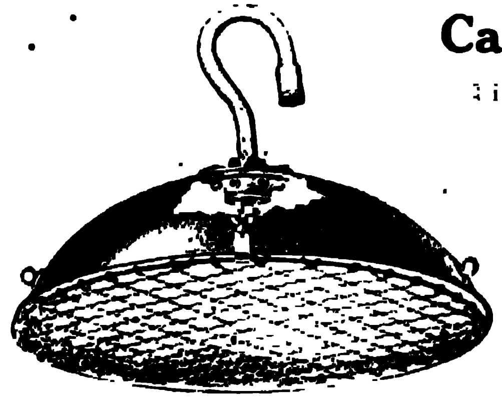


Fig 1971

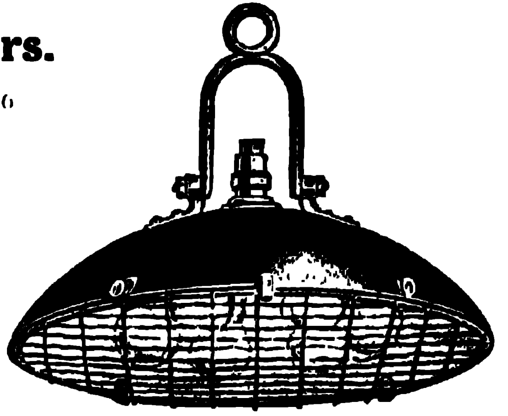


Fig. 1972.

Fig. No.	Particulars	Price
C. 1971 G.	6-Light fitting with 20-inch Reflector and Guard.	Rs. 32
C. 1972 G.	4 " " " 16 " " " "	" 36
	6 " " " 20 " " " "	" 40

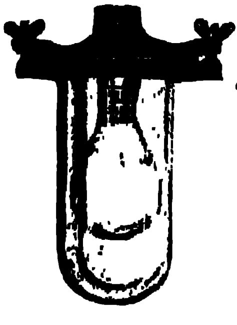
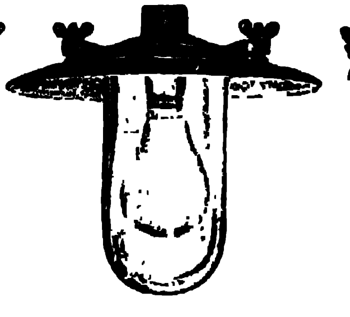
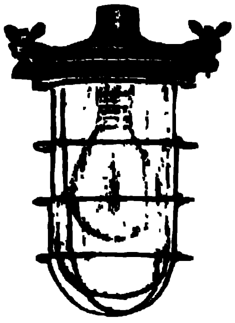
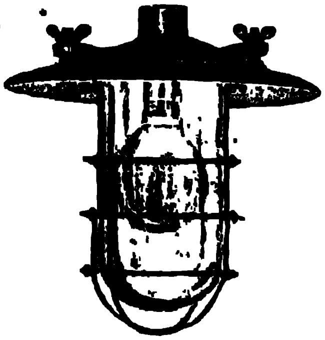
Holders and Lamps are not included in the above prices.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

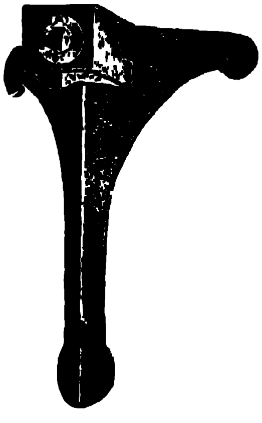
RANGOON, MADRAS,
BOMBAY, LONDON.

Weather-proof Fittings for Mills, Collieries, Ships, Etc.

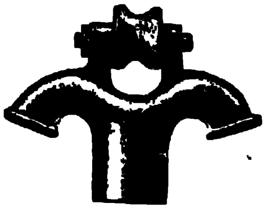





16 to 50 C.P. } C 1000 **Rs. 3-0** C 1001 **Rs. 4-0** C 1002 **Rs. 5-0** C 1003 **Rs. 5-12**
M. F. Lamps }

Holders and lamps are not included in the prices. Well glasses 6¼" deep. Well glasses 7½" deep and Guards to suit can be fitted to above fittings at an extra charge of Rs. 1-12 each.

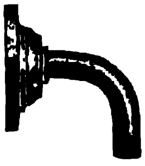


C 1930.
Angle Plate.
½" Gas **Rs. 3-8** each.

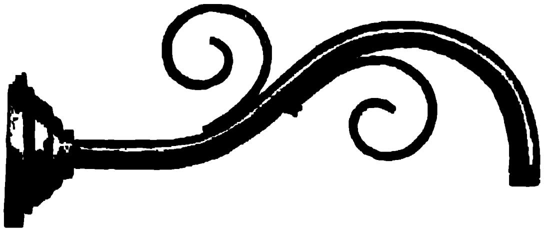


C 1912.

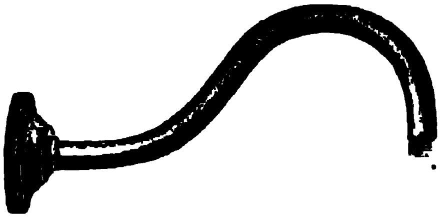
Suspender ½" **Rs. 2-8** each
„ ¾" „ **4-8** „



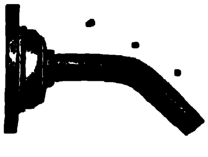
B 7—½" Gas
4½" projection.
Rs. 2-4.



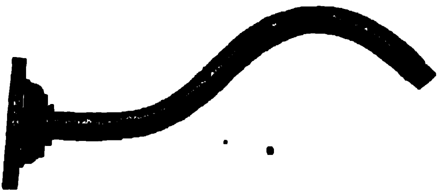
B 1.—Gas 12" projection **Rs. 7-4** each.



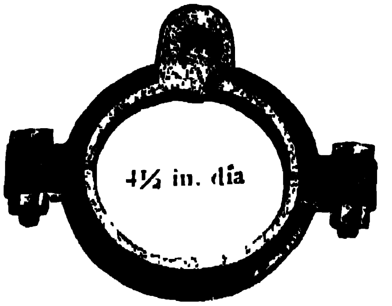
B 4.—Gas 12" projection. **Rs. 3-8** each.



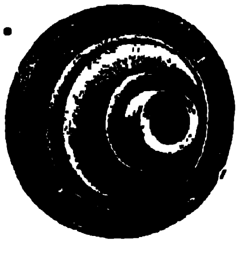
B 8.—½" Gas
4" projection
Rs. 2-8 each.



B 5.—Gas 12" projection. **Rs. 3-4** each.



C 1997.
Pole Clamp, ½". **Rs. 8-0** each.



C 1773.
Black Plate, ½" Glass
As. 14 each.

Floor and Table Standards.

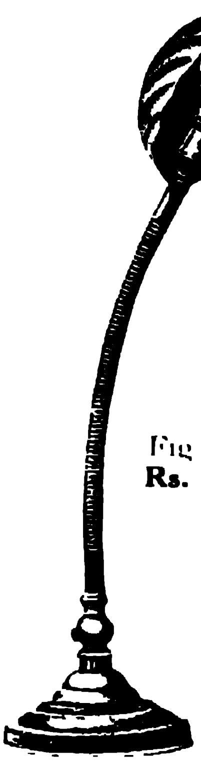


Fig. 4000.
Rs. 12-0.

Nickel-plated
Shell Reflectors
as fitted on
above
Standard.
Rs. 24-0 per doz.

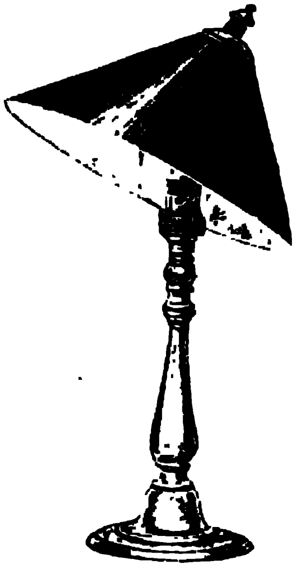


Fig. 2196.
Rs. 11-0.

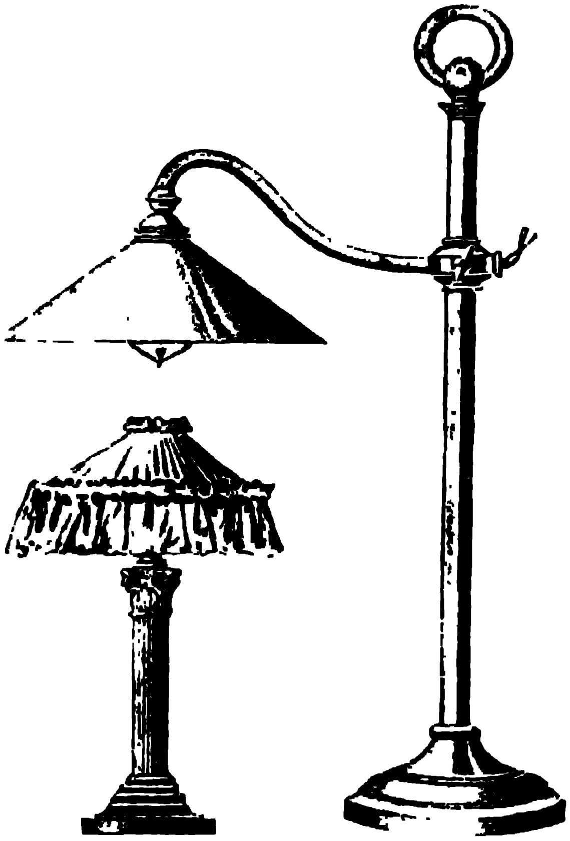


Fig. 1654.
Rs. 13-0.

Fig. 1633
Rs. 18-0.

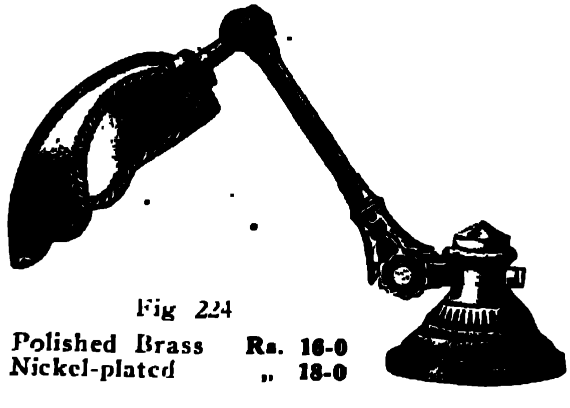


Fig 224

Polished Brass	**Rs. 16-0**
Nickel-plated	**„ 18-0**

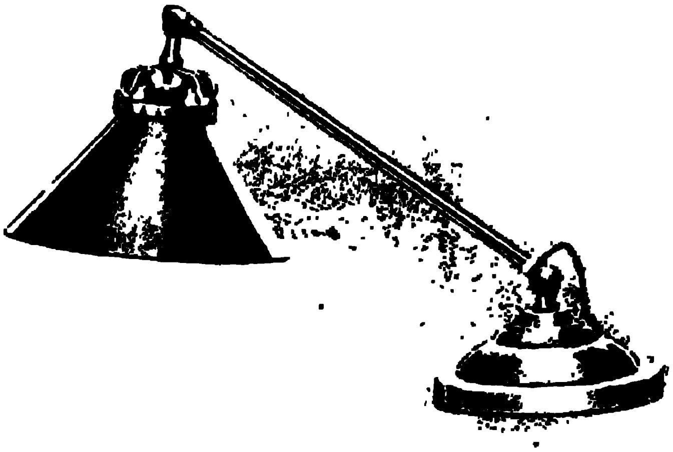


Fig. 2181. **Rs. 12-0.**

Note.—Shades, Holders and Carriers, where shown, are not included in the price.

Pendants.

Fig. 1151.

Two-light Polished Brass Pendant, Fitting only .. **Rs. 32-0** each.

Fig. 1152.

Two-light Polished Brass Pendant, Fitting only .. **Rs. 27-0** each.

Shades and Holders Extra.

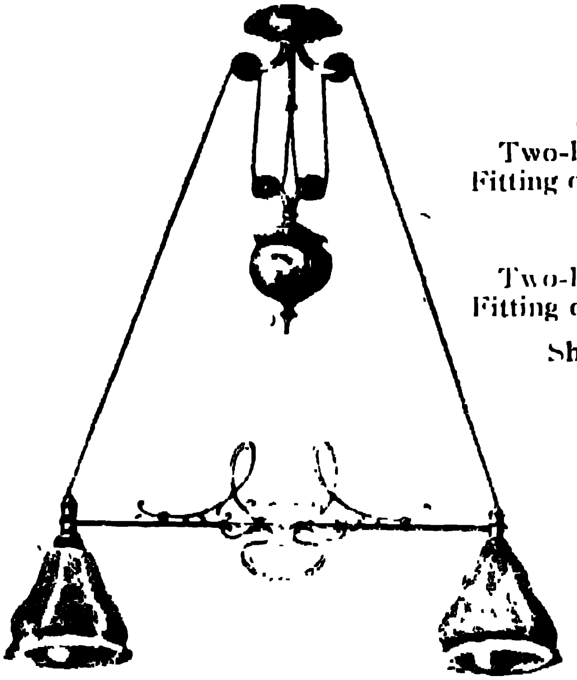


Fig. 1151.

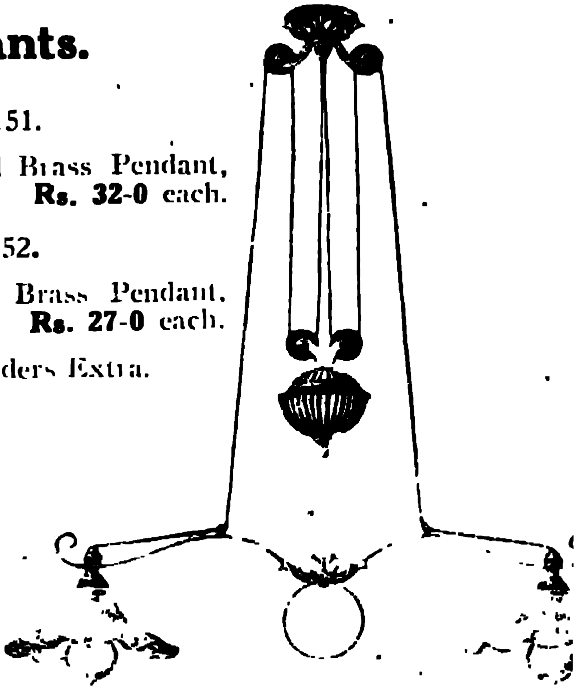


Fig. 1152.

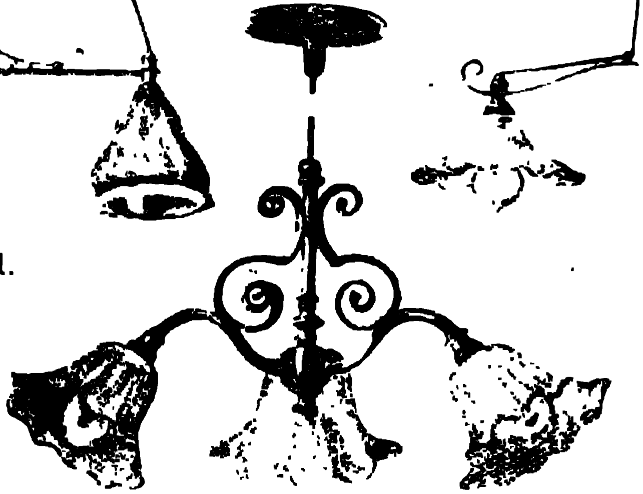


Fig. 1378.

Three-light Polished Brass Pendant, Fitting only.
Rs. 24-0 each.

Shades and Holders Extra

Alabaster Bowl Fittings for Semi-Direct Lighting fitted with P. B. chains and ceiling plate Overall length 36 ins.

14 ins. Plain Bowl, **Rs. 180-0** each.

16 ins. Plain Bowl, **Rs. 225-0** each

18 ins. Plain Bowl, **Rs. 300-0** each.

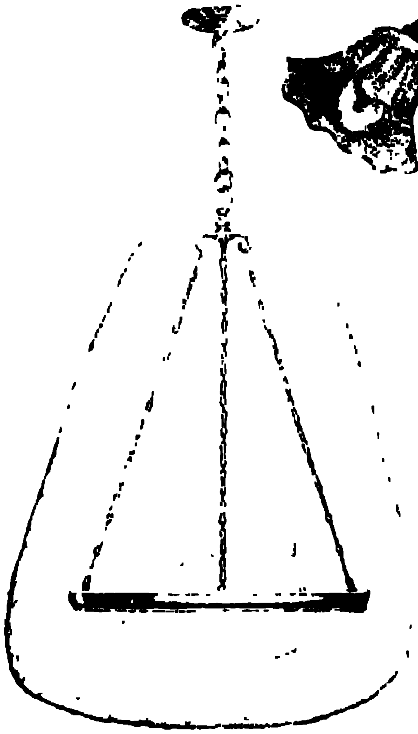


Fig. 3400.

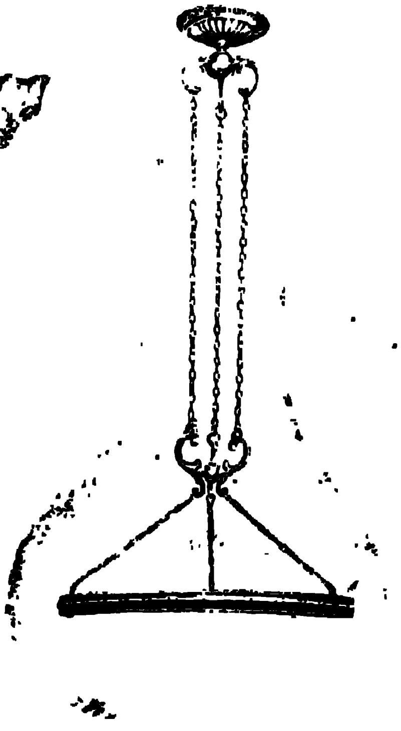


Fig. 3402.

Fig. 3400. Semi-Direct Lighting Polished Brass Pendant, with chain and ceiling plate. 36 inches long overall with Flint Satin Glass Dish .. . . **Rs. 100-0**

Fig. 3402. Semi-Direct Lighting Polished Brass Pendant, with chain and ceiling plate. 36 inches long overall with Flint Satin Glass Dish **Rs. 125-0**

Brass Lamp Brackets.

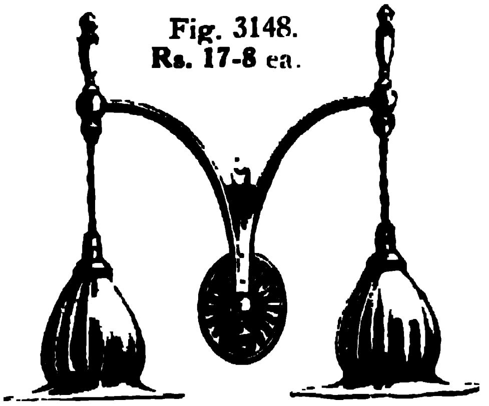


Fig. 3148.
Rs. 17-8 ea.

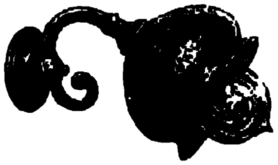


Fig. 2370.
Rs. 7-0 ea.

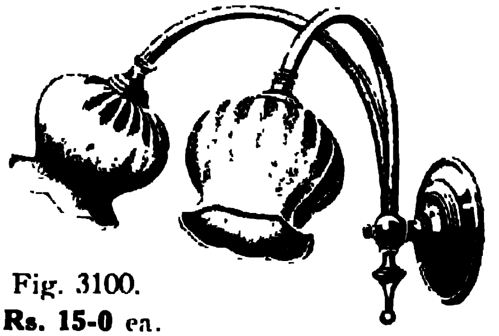


Fig. 3100.
Rs. 15-0 ea.

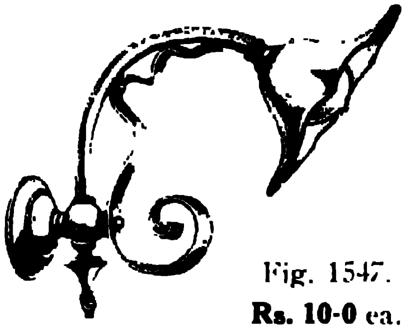
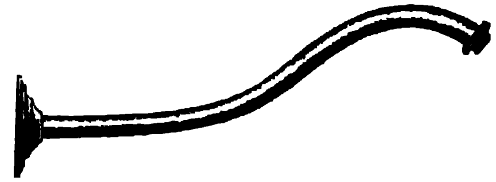


Fig. 1547.
Rs. 10-0 ea.
Canting Brackets.

Holders, Shades and Carriers, where shown, are not included in the Price



Projection	Nipple	
6 ins	½ in	.. **Rs. 20-0** doz
9 ,,	½ ,,	.. ,, **22-0** ,,
12 ,,	½ ,,	.. ,, **24-0** ,,

Dugdill's Patent Movable Fittings (Self-Sustaining Joints).

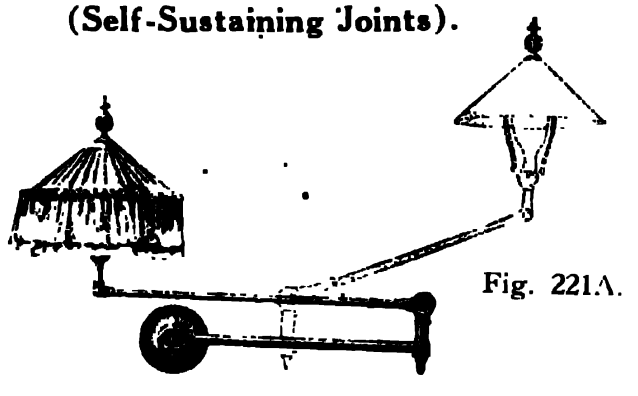
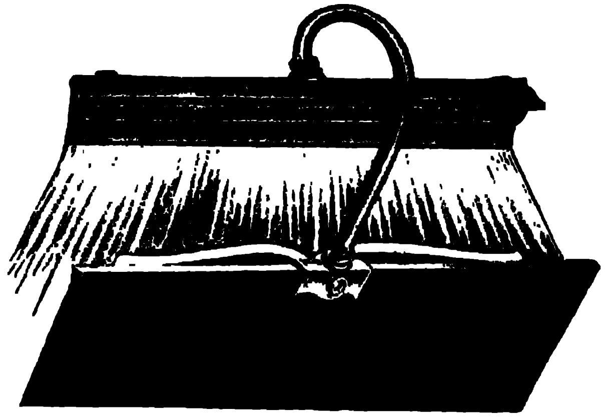


Fig. 221A.

Enamelled Steel Bracket.
3 ft. 6 ins. overall.
Rs. 17-0 each.



"Striplite" Music Desk Light.
Polished Brass Bracket and Clamp, with "Striplight" Reflector .. **Rs. 24-0** each.
"Striplight" Lamps for above, 12 C.P.
Rs. 4-8 each.

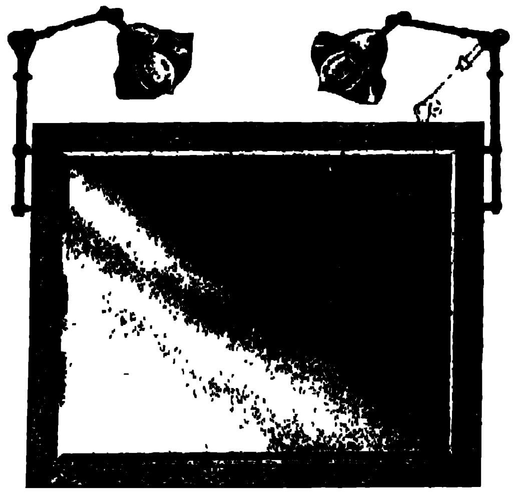
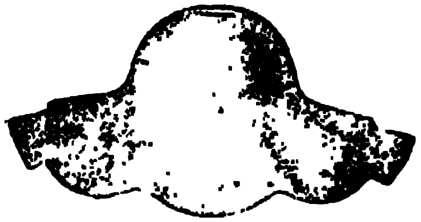


Fig. 229B.
Polished Brass Mirror Brackets.
Complete with Holder.
To be applied in pairs for Shadowless Illumination. 12 ins. high by 9 ins. Arm.
Rs. 18-0 each.

Installation Fittings and Accessories.

Shades for Lamps.



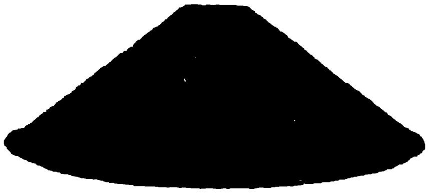
Langham Shades.

White Opal. 1¼ ins. opening.

Size.	Price, per dozen.	
Ins.	Rs.	A.
6	10	0
8	11	0

A variety of fancy Shades too numerous to illustrate.

Price from Rs. 16 to Rs. 60 per doz.



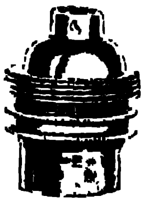
Conical Shades. 1¼ ins. Hole.

Size.	Description.	Price, per dozen.	
Ins.		Rs	A.
10	White Opal,	6	8
	Green and White Opal.	14	0
	Enamelled Iron	6	12
15	White Opal	48	0
18	Enamelled Iron	48	0
15		36	0

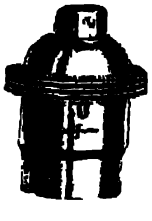
Lamp Holders.

In Polished Brass, thoroughly insulated for High Voltage Circuits Standard Bayonet Sockets.

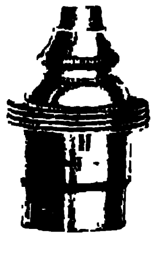
A



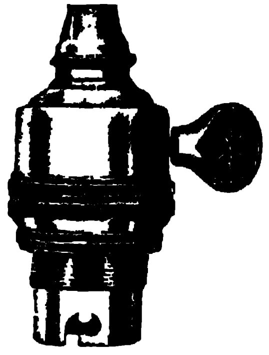
B



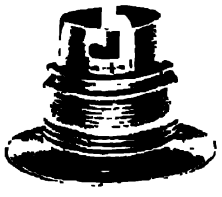
C



E



F



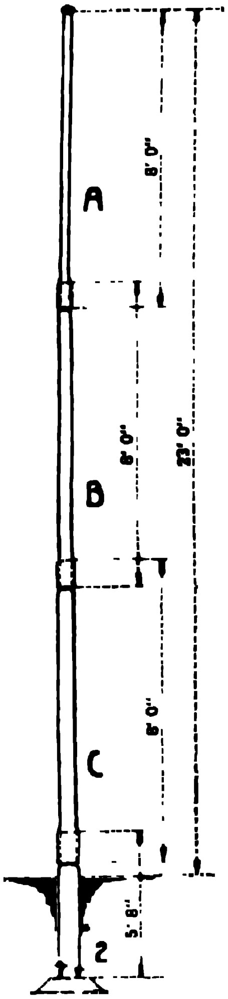
G

Type.	Description.	Thread.	Price, per dozen.	
		Inch.	Rs.	A.
A	Without Shade Carrier or Cord Grip	½	5	8
	„ „ „ „ „ „	⅝	5	8
B	With Shade Carrier only ..	½	6	8
	„ „ „	⅝	6	8
C Suspension	With Shade Carrier and Cord Grip	.	7	0
D „	Key Switch Holder with Shade Carrier and Cord Grip	..	24	0
E „	„ „ „ „ „ „ only .	½	21	0
F Batten	With Shade Carrier „ .. „ .. .	..	6	8
„	Without „ „	..	5	8
Goliath	For Half-Watt Lamps with Screw Caps .. .	⅝	26	0

Tubular Steel Poles, Brackets, Etc.

Suitable for Electric, Telegraph and Telephone Wires.

Poles and Plates.

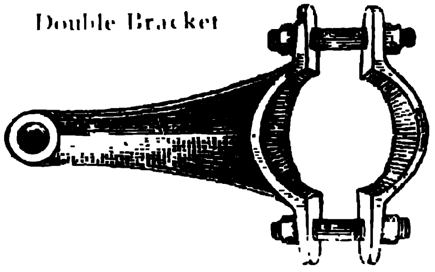


Pole							Price, each.		Ground Pieces with Plates.				Price, each.	
Section	Length Overall		Length fitted up		Diameter				Section.	Length.		Diameter.		
	Ft	Ins	Ft	Ins	Ins		Rs	A		Ft.	Ins.	Ins.	Rs.	A.
A	8	0	7	$3\frac{1}{2}$	3		7	0	1	4	$10\frac{1}{2}$	$4\frac{1}{2}$	8	8
B	8	0	7	$3\frac{1}{2}$	$3\frac{3}{4}$		10	8	2	5	8	$5\frac{1}{4}$	11	8
C	8	0	7	$2\frac{9}{16}$	$4\frac{1}{2}$		14	0	3	6	5	$6\frac{1}{4}$	16	0
D	8	0	7	$2\frac{5}{16}$	$5\frac{1}{4}$		16	8	4	7	3	7	27	8
E	8	0	7	$1\frac{3}{8}$	$6\frac{1}{4}$		22	0	5	8	2	8	35	8
F	8	0	7	$1\frac{3}{8}$	7		29	8	6	8	10	9	50	0
G	8	0	6	11	8		34	0	7	9	0	10	57	0
H	8	0	6	11	9		45	0						

Galvanized Malleable Iron Brackets.

For "Steel" Poles.

Double Bracket



Single Bracket

To fit Tubes, Size	Diameter	Price.			
		Single.		Double.	
	Ins.	Rs.	A	Rs.	A.
A	$2\frac{1}{2}$	6	0	8	4
B	$4\frac{1}{4}$	7	8	9	8
C	$5\frac{1}{4}$	8	8	10	8

Wall Brackets.

These can be made up to suit any conditions on receipt of particulars of requirements.

Stay Swivels and Stay Rods.

Stay Swivel

Stay Rod.

Galvanized Stay Swivels, ⅝ in. with thimble complete **Rs 4-8 each.** **Rs. 52-0** per dozen.

" " Rods ⅝ in. × 6 ft. " " **7-8** "

Westinghouse Type "M.P." Weather-proof Lightning Arresters.

For A. C. or D. C. Circuits not exceeding 600 Volts.

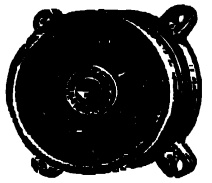
Used largely for the protection of Tramway Motors and Generating Station Apparatus.

Construction and Action.—The arrester itself consists of a specially prepared block or thick disc of carborundum; the area offered for discharges being great in comparison with the length of path through which they pass. In this block are numerous separate discharge paths, each of which consists of minute air gaps (hence the name M P—multipath): and a discharge in passing through the block divides and takes these different paths simultaneously. The resistance of the small air gaps sufficient to prevent the line voltage from maintaining an arc across them; thus **the arrester is non-arcing** and the line current cannot follow the discharge.

Insulation from Line.—In series with the carborundum block is a main air gap which—except at the instant of discharge—insulates the arrester from the line.

Range of voltage 0 to 600. Each **Rs. 33-0.**

Winches and Lowering Gear for Half-Watt Fittings and Arc Lamps.



Open Type.

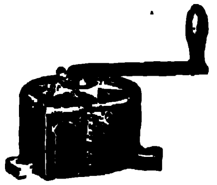
Takes 150 ft. $\frac{3}{8}$ in. cir. flex.

Star Type.

Takes 60 ft. $\frac{3}{8}$ in cir. flex

Street Lighting.

Iron-Clad D. P Switch and Fuse.



Winch for 60 lbs. weight, to take 75 ft. of $\frac{3}{16}$ in. or 50 ft. of $\frac{1}{4}$ in. Steel Rope.

Price, each **Rs. 18-0**

Price, each

Rs. 7-0

C 1070

Price, each

Rs. 8-0

C 2332.

10 Amps.

Price, each **Rs. 25-0**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Simplex Conduits, Ltd.

Simplex, Solid Drawn, Heavy Gauge, Insulated Conduits and Fittings.

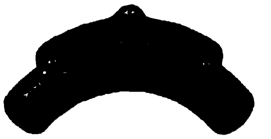
Enamelled, Screwed Standard Gas Thread.

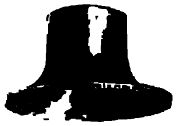
Distinctive Features of Simplex Conduits.

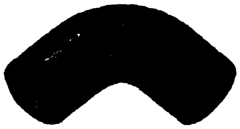
1—Every length of Simplex conduit, after being finally approved by the Inspection Department, is now marked with a distinctive red label

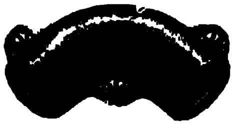
2—Every length of screwed conduit sent out is fitted at the one end with a screwed coupler, and at the other end with a cap of suitable material completely covering and protecting the clean threads which are cut after the enamelling of the conduit. See illustration.

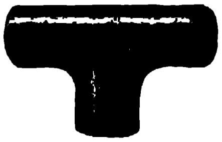
Normal Bend

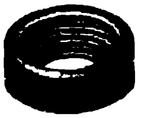

Inspection Normal Bend.

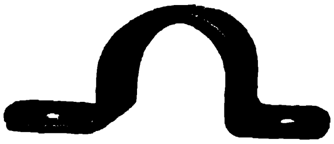

Iron Bell Mouth.


Sharp Bend.


Split Sharp Bend


Tee.


Insulating Bush.


Saddle.

Size External diameter	¾"	1"	1¼"	1½"	2"	
	Rs. A.	Rs. A.	Rs. A.	Rs. A.	Rs. A.	
Conduit Pipe	37 8	46 0	52 4	76 8	114 0	per 100 feet.
Normal Bend	6 12	10 4	20 8	25 8	47 8	,, dozen.
Inspection Normal Bend	12 12	15 4	32 4	49 4	69 12	,, ,,
Sharp Bend	4 12	6 12	12 12	23 12	30 8	,, ,,
Inspection Sharp Bend	9 0	14 4	18 12	38 4	64 8	,, ,,
Split Sharp Bend	12 12	17 0	30 12	42 0	71 8	,, ,,
Solid Tee	8 0	12 12	23 8	38 0	64 8	,, ,,
Inspection Tee	10 4	18 12	29 0	43 8	85 0	,, ,,
Split Tee	18 0	25 8	41 12	59 0	95 4	,, ,,
Straight through Junction Box	24 12	28 0	47 8	....	....	,, ,,
Tee Joint Box	25 8	30 12	52 12	....	....	,, ,,
Saddle	3 4	3 14	5 12	7 12	10 4	,, gross.
Saddles, two way	5 8	....	....	.. .	....	,, ,,
Insulating Bush	0 14	1 10	2 8	3 8	4 4	,, dozen.
Couplings	3 14	5 0	6 12	12 12	17 0	,, ,,
Bell Mouth	6 12	9 0	16 4	22 0	27 4	,, ,,
Lock Nuts	3 4	6 12	10 12	13 8	17 12	,, ,,

Screwed Reducers .. 1" to ¾" **Rs. 8-4** per dozen. 1¼" to 1" .. **Rs. 9-12** per dozen.

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & CO. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

"Durex" Electrical Wiring System.

Durex Watertight 5 Amp. Switches.

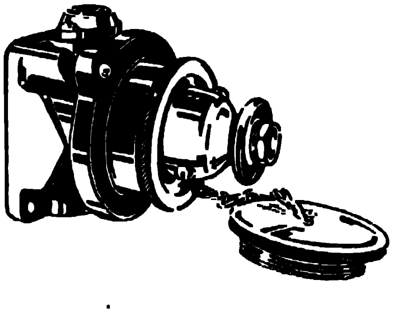
Standard Finish:
Stove Enamelled
French Grey.

This fitting comprises a watertight and gas-tight quick make and break switch, which is operated by a spindle passing through a packing gland in the cover.

Complete, as illustrated, with Durex Glands.

List No. ..	D. 110	D. 111	D. 112	D. 113	D. 114
Price, per doz. **Rs.**	**63-12**				

Durex Watertight 5 Amp. Plugs.



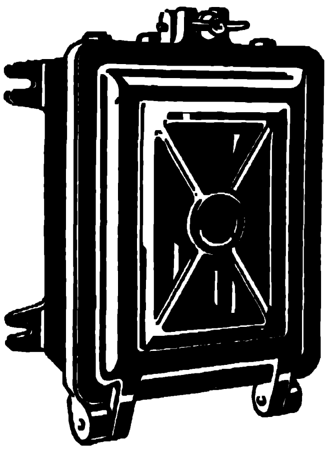
The box cover, plug cover, locking ring and cap are of brass and all terminals are shrouded in insulating material.

The plug is provided with a watertight gland to receive 3-core flexible (C.T.S.).

Complete with 3-pin Plug, Cover, Cap and Durex Glands.

List No.	D. 115	D. 116	D. 117	D. 118	D. 119
Price, per doz. **Rs.**	**136-0**				

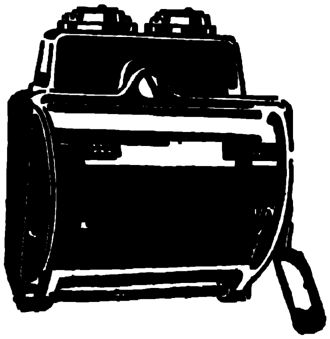
Durex Double Pole Cut-Out.



A dividing fillet is provided between the poles and the junction of the cover, and the box is packed with cord asbestos to ensure a thoroughly good imperishable watertight joint.

Fuses may be wired to capacity required. List No. D. 124. **Price, Rs. 12-0** each.

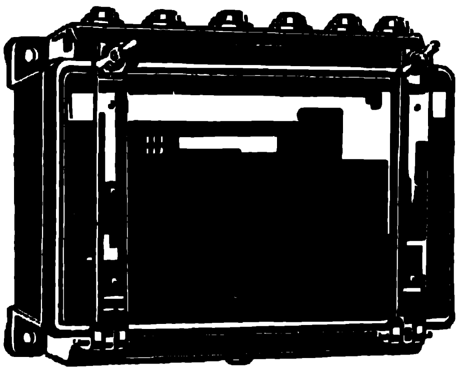
D. P. Ironclad Switch.



Complete with Durex Glands.

Amperes. 250V.	**Amperes.** 500V.	**Price, each.**
15	10	**Rs. 6-0**

Durex Ironclad Distribution Boards.



250 volts.
5-15 amps.

These boards are fitted with porcelain fuse units that comply fully with Home Office Regulations, and are equally suitable for domestic or light industrial services.

Fitted with Durex Glands.

List No.	No. of ways.	**Price, each.**
D. 134		**Rs. 22-0**

D. P. Ironclad Switch-Fuse Boards.

This range is similar to the above but fitted at the bottom with a quick make and break switch for each double pole fuse-way. Each switch is operated by an external ring handle.

List No.	No of ways.	**Price, each.**
D. 154	4	**Rs. 39-0**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

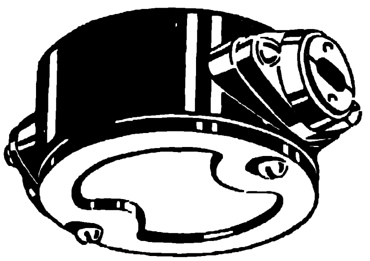
RANGOON, MADRAS.
BOMBAY, LONDON.

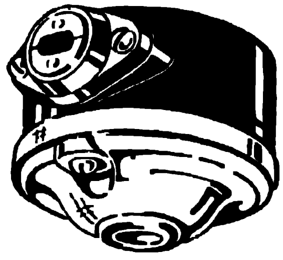
"Durex" Electrical Wiring System.

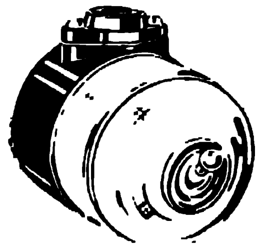
All DUREX Fittings and Distribution Gear are provided with **Heavy Metal Covers and DUREX Patent** conical watertight and gas-tight glands which provide mechanically sound attachment of the cable to the fitting.

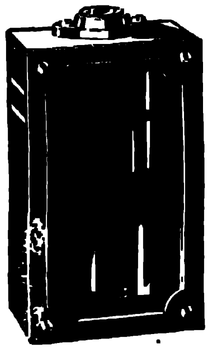
DUREX Fittings may be used with either DUREX D.M.S. or C.T.S. Cables at will.

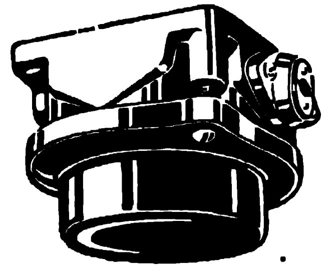
Standard Finish : Stove Enamel French Grey











Durex Outlet Junction Boxes.

Prices per dozen.

Complete with heavy covers and DUREX Glands.

No of ways	-()-	-()-	()	-()-	-()-
List No ..	D.10	D.11	D.12	D.13	D.14
Price Rs.	**10-12**	**11-12**	**11-12**	**12-12**	**14-0**

Durex Ceiling Rose Fittings.

List No.	D.20	D.21	D.22	D.23	D.24
Price Rs.	**16-8**	**17-12**		..	

Durex Switch Fittings.

List No.	D.30	D.31	D.32	D.33	D.34
Price Rs.	**27-4**	**29-0**		.	

Durex Lamp Holder Fittings.

List No ..	D.50	D.51	D.52	D.53	D.54
Price Rs	**19-0**	**20-8**	.	.	.

Durex Adaptable Boxes.

Prices each.

Size ins	2¼ × 4¼	2⅛ × 7⅛
List No	D.61	D.62
Price Rs.	**2-4**	**2-8**

Durex Watertight Junction Boxes.

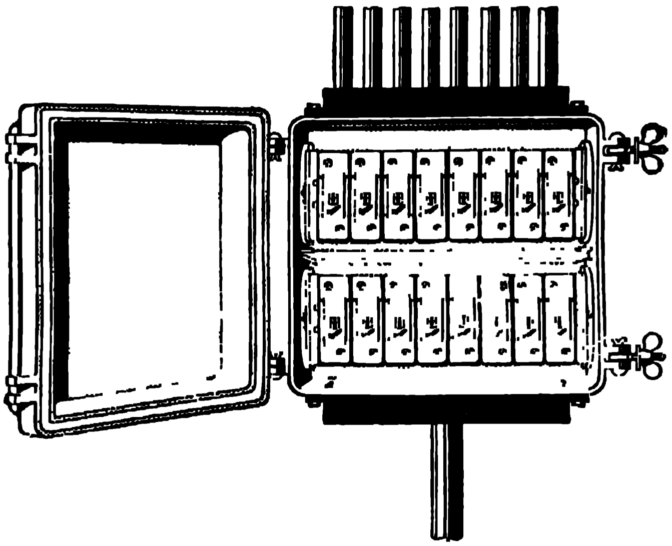
Prices per dozen.

Complete with universal interior and DUREX Glands.

No of ways	-()-	-()-	-()	-()-	-()-
List No. ..	D.100	D.101	D.102	D.103	D.104
Price . Rs.	**35-12**	**37-8**	..	**39-0**	..

Simplex "Diaduct" Distribution Boards.

5/30 AMPS. per way.



The "Diaduct" Fuse Unit complies fully with the Home Office Regulations. It possesses great mechanical strength and is fitted with phosphor-bronze contact clips of ample area. It is easily re-wireable, and all live metal parts are effectively shielded. Full expansion space is provided for the gases of explosion and their discharge is directed *away* from metal parts through a diagonal duct. These latter features are especially important.

The Bus-Bars are of heavy section High Conductivity metal, each provided with ample cable sockets of special design which increases the clearance both from the bottom of the case and the opposite bus-bar.

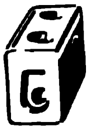
The Mounting: Each bank of fuses is mounted on mica-insulated steel rods. These in their turn are attached to cradles of ingenious design, which are secured to the sides of the case by readily detachable bolts.

This arrangement, whilst ensuring sound and rigid construction and absolute insulation, permits of each bank of fuses being swung either upwards or downwards as required or being entirely removed if necessary. It also constitutes the most convenient grouping possible for easy wiring and inspection.

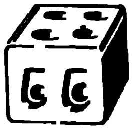
The Dividing Fillet is of special non-warping fire-proof material, rigidly attached to, yet readily detachable from, the case. It is secured to the sides by being inserted in metal channel pieces affixed to the case.

Iron-Clad Pattern.

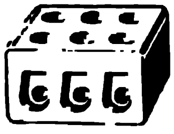
No. of ways.	List No.	Price, each.
	11804	Rs 51-0
	11806	,, 68-0
	11808	,, 85-0



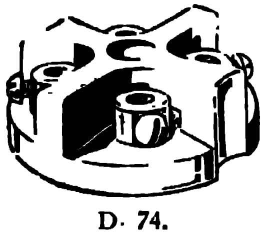
D. 71.



D. 72.



D. 73.



D. 74.

DUREX CONNECTORS. GLANDS, CONES, Etc.

All Durex connectors are best quality English Porcelain, and are fitted with terminals suitable for cables up to 3/.036

Prices per dozen.

List No.	No. of ways.	Price, per doz.
D.71	1	**Rs. 1-10**
D.72	2	**„ 2-14**
D.73	3	**„ 4-3**

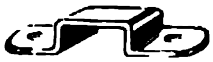
DUREX (4-WAY) UNIVERSAL PORCELAIN CONNECTOR.

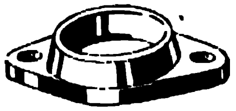
Patent No. 172102.

This type is suitable for the watertight series of junction boxes listed on page 850. This connector is mounted on a central pillar screwed to the bottom of the box which greatly facilitates wiring.

List No. D.74. Connectors.

Rs 16-4 per doz.





DUREX FIXING SADDLES.

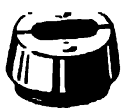
Heavy Gauge Tinned Brass 3/16 in deep.

Prices per gross.

Size, ins.		
List No.	D.82	D.83
Price, Rs	**3-3**	**3-14**

DUREX GUN-METAL GLAND CASINGS.

List No. D.91 **Rs. 1-1** per doz.



DUREX GLAND CONES.

List No. D.92 .. **Re. 1-0** doz pairs.

Teakwood Casing and Capping.

Machine Made. Two Grooved.

Size	**Price** per 100 feet.	Size.	**Price** per 100 feet.	
1½ by ½ ins.	.. **Rs. 7-0**	1½ by ¾ ins.	.. **Rs. 10-0**	Other Sizes made to order.
1¾ .. ½ ..	.. **„ 10-8**	1¾ .. ¾ „	.. **„ 12-12**	
2 .. ½ ..	.. **„ 12-0**	2 .. ¾ ..	.. **„ 14-0**	**Prices on application.**
2½ „ ½ ..	.. **„ 16-8**	2½ .. ¾ ..	.. **„ 21-0**	
		3 „ ¾ „	.. **„ 32-0**	

Polished Round Wooden Blocks.

Size In inche	**Solid** **Price** per doz.	**Recessed.** **Price** per doz.
	.. **Rs. 1-0**	**Rs. 1-6**
	.. **„ 1-8**	**„ 1-14**
	. **„ 2-12**	**„ 3-0**
	4-0	**4-8**

Polished Oblong Blocks.

Size In inches.	**Solid** **Price** per doz.	**Recessed.** **Price** per doz.
6 by 3 ins.	.. **Rs. 1-14**	**Rs. 2-4**
	2-4	**2-12**

Regulator and 3 Switch Blocks.

Solid, Rs. 26-0 Recessed, Rs. 30-0 per doz.

Polished Teakwood Boards.

Size	**Price** per doz.
8 by 8 ins. ..	.. **Rs. 8-0**
10 .. 8 .. .	.. **„ 9-12**
12 .. 10 .. . .:	.. **„ 14-0**
14 „ 10 .. .	.. **„ 15-12**
12 .. 12	.. **„ 16-0**
15 .. 12	.. **„ 20-0**
18 .. 10	.. **„ 21-0**
18 .. 15	.. **„ 34-0**

Plugs, Iron or Brass Screws, and everything necessary for fixing casing and Blocks will be quoted for on application.

Clincher Patent Plugs for fixing into Wall.

Size	**Price** per 100.
¾ in. dia. by 2 ins. long.	**Rs. 4-8**
½ „ „ „ 1½ „ „	**„ 3-12**

Special Moulded Capping made up to requirements.
Prices on application.

Insulated Wires and Cables, Taped and Braided.

Old Standard.	New Standard.	Price, per Coil of 100 yards. Association	All 600 Megohms Grade. Carrying capacity in amperes at I.E.E. Standards.	25 C.P. 220 volts Metal Filament Lamps.
		Rs. As.		
1/18	1/·044	8 12	6·1	13
1/16	1/·064	12 14	12·9	
3/22	3/·029	11 4	7·8	13
3/20	3/·036	15 0	12·0	23
7/22	7/·029	18 12	18·2	31
7/20	7/·036	23 8	24	51
7/18	7/·044	31 12	31	91
7/16	7/·064	48 8	46	162
7/14 19/17	19/·052	87 14	64	247
19/16	19/·064	117 8	83	440
19/15	19/·072	148 12	97	556
19/14	19/·083	190 0	118	670
37/16	37/·064	231 4	130	855
37/15	37/·072	302 8	152	1337

Metal-Sheathed, Insulated Wires and Cables. Taped and Braided.

Old Standard.	New Standard.	Single Core. Price, per 100 yards.	Two Core. Price, per 100 yards.	Three Core. Price, per 100 yards.
		Rs. As.	Rs. As.	Rs. As.
1/18	1/·044	25 0	37 8	59 8
3/22	3/·029	30 0	50 0	68 12
3/20	3/·036	35 0	56 4	75 0
7/22	7/·029	40 0	68 12	
7/20	7/·036	55 0	87 8	
7/18	7/·044	62 8	100 0	...
7/16	7/·064	125 0	187 8	..
19/16	19/·064			

Silk, Cotton and Workshop Flexibles.

Size.		Single and Double Vulcanized Glace Cotton Flexibles.		Double Vulcanized Silk Flexible	Workshop Flexible.
		Single Vulc.	Double Vulc		
		Rs. As	Rs. As.	Rs. As.	Rs. As.
35/40	Price, per 100 Yards.	...	30 0	.. .	...
14/36		16 4	28 12	31 4	20 0
70/40		....	56 0	....	....
110/36		55 0	60 0	81 4	62 8

114/38, Spiral Armoured. Cargo Flexible Wire, **Rs. 180** per 100 yards.
70/36, „ „ „ „ „ „ **64** „ „ „

Twin Shot-Firing Wire. Conductors of 4/·018 plain copper wires special Insulation and Taped, **Rs. 26-0** per coil of 100 yards.

ALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Silk, Cotton and Enamel Covered Wires, Tin Fuse Wires, Tinned Copper Fuse or Binding Wires, Eureka Resistance Wires.

Prices Per Pound.

Size S. W. G.	S. S. C.		D. S. C.		S. C. C.		D. C. C.		Enamelled.		Tin Fuse.		Tinned Copper.		Bare Eureka.		D. S. C. Eureka.	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.	Rs	A	Rs.	A	Rs.	A	Rs.	A.
10							1	2	....									
11							1	4							3	0		
12							1	6							3	0		
13							1	7							....			
14							1	8			4	5			3	0		
15							1	8							3	0		
16							1	8	2	4	4	6			3	0		
17							1	12										
18							1	12	2	8	4	8			3	0		
19							2	0	2	10	...							
20							2	0	2	12	4	10	2	4	3	4		
21			4	8			2	2	2	12								
22			4	8			2	4	3	0	4	14	2	6	3	10		
23							2	8										
24	4	4	4	14	2	6	2	12	3	4	5	6			5	0		
25	5	0			2	8	3	0	3	8								
26	5	4	5	10	2	12	3	0	3	8	5	8			5	2		
27					2	14	3	6	4	12	....				....			
28	6	0	7	0	3	0	3	8	4	0	5	8			5	4		
29			7	4			4	2	4	14	...				5	4		
30			7	8			4	6	4	14	5	8			5	8		
31			8	0					4	14					....			
32			8	6					5	0	6	0			5	8	...	
33			9	8											....			
34	9	0	10	0					6	4	6	12	....		7	2	....	
35			11	0					6	4	...				....		....	
36			11	12					7	0	7	8			9	8	22	0
38	14	0	15	0					8	8	...				10	0	30	0
40	20	0	21	0					11	0	...		....		24	0	38	0
42	25	0	54	0					12	0	....		....		26	0	....	

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Electric Wires.

Motor Flexibles.

7 m/m	Re. 0-5	per yard
9 ,,	,, 0-8	,, ,,
12 ,,	,, 0-12	,, ,,

Hard Drawn Bare Copper Wires.

All usual S.W.G. size of Single Conductors Stocked. Prices vary with market.

Tinned Steel Armature Binding Wire.

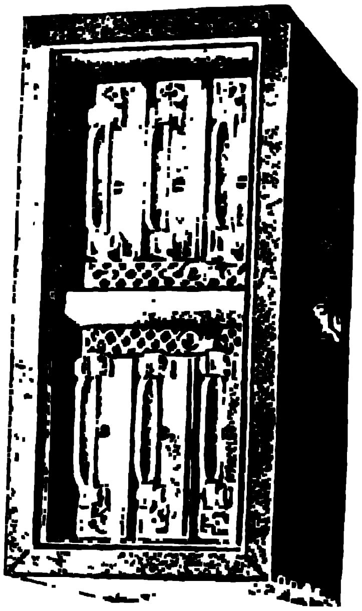
S.W.G.		18	20		24
Price, per lb.	**Rs.**	**1-8**	**1-10**	**1-12**	**2-0**

Installation Fittings and Accessories.
Distribution Boards.

For High Voltage Circuits.

Single and Double Pole.

5 Amperes Capacity.



These Distribution Boards are supplied mounted on solid polished cases, with glass front, hook and eye; heavy polished brass parts, uralite dividing fillet, springclip terminals and separate china bases.

2½ inches break

Number of Ways		2	3	4	5	6			10
Single Pole	Each **Rs.**	**5-8**	**6-4**	**7-8**	**9-0**	**10-8**	**12-8**	**15-0**	**16-8**
Double Pole		**6-8**	**8-8**	**10-8**	**13-12**	**16-0**	**23-0**	**27-0**	**31-0**

Spare Fuse Carriers, 5 Amperes **Rs. 12** per dozen.

These are of a high grade cream china with substantial terminals and suitable for circuits up to 250 Volts.

Installation Fittings and Accessories.

Ceiling Roses.

For High Voltage Circuits. Loop-in Type, in White Porcelain "H" Insulation, and fitted with large terminals.

The Porcelain Bridge assists in supporting the flexible wire (which passes through the holes therein) and pendant, thus taking the dead weight of the screw terminals.

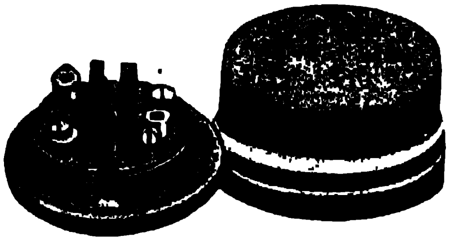
Size. Diameter of Base	Price.	
	Per dozen.	Per gross.
Ins.	Rs. A.	Rs. A
2½	4 8	52 0

5 amp. 3 Plate Ceiling Roses. **Rs. 9-0** per dozen

Cut-Outs.

For High Voltage Circuits. Porcelain Type with bridge insulation and ventilated cover.

Bow Shape. Fig. 1.



Amperes	Price.	
	Per dozen.	Per gross.
	Rs. A.	Rs. A.
	4 8	52 0
10	9 0	102 0

Oblong Shape (Small). Fig. 2.

Ampere	Price.	
	Per dozen.	Per gross.
	Rs. A.	Rs. A.
10	9 0	102 0
20	24 0	272 0

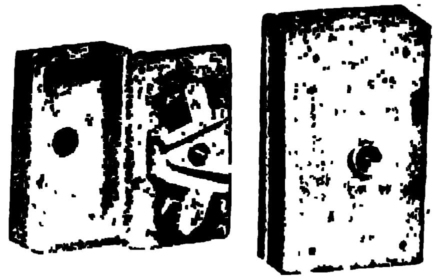
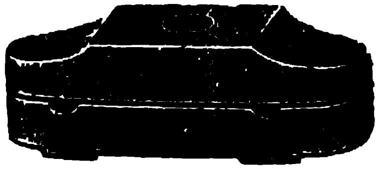


Fig. 2.

Porcelain Cleats with Two Grooves.



Length Ins.	Width Ins.	Height. Ins.	Grooves		Price.	
			No.	Size. Ins.	Per dozen.	Per gross.
					Rs. A.	Rs. A.
1⅝	[illegible]	¾	2	⅛	0 7	4 8
2	1	1	2	¼	0 8	5 4
4	1⅜	1¼	2	½	1 14	22 0

Spacing Insulators, Size 1 × $\frac{5}{16}$ in., per Gross, Rs. 3-8.

CALCUTTA, JAMSHEDPUR, DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

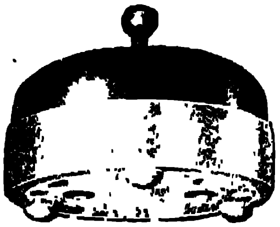
RANGOON, MADRAS, BOMBAY, LONDON.

Tumbler Switches.

Tropical Pattern.

Patent quick make—quick break.

The projecting feet at the back of the base give an ample air draught space, thereby minimising the leakage to earth in moist situations.

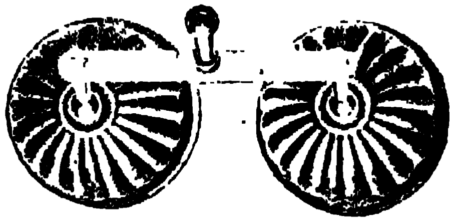


Ampere Capacity.	Type.	Price, per doz.	
		Rs.	**A.**
15	No. 930. P.B. Covers Insulated Handle	**14**	**8**
	No. 1530. P. B. Covers Insulated Handle	**30**	**0**

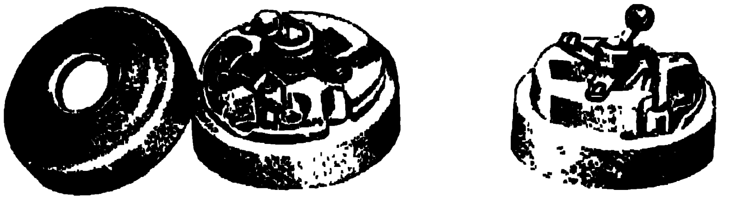
Capacity.	Particulars.	Price. Each.		Per doz.	
		Rs.	**A.**	**Rs.**	**A.**
5 Amps.	Polished Brass Plain Cover	**3**	**12**	**43**	**0**
15 "	" " "	**5**	**4**	**60**	**0**
20 "	" " "	**5**	**8**	**66**	**0**

Coupled Tumbler Type Switches, Double Pole

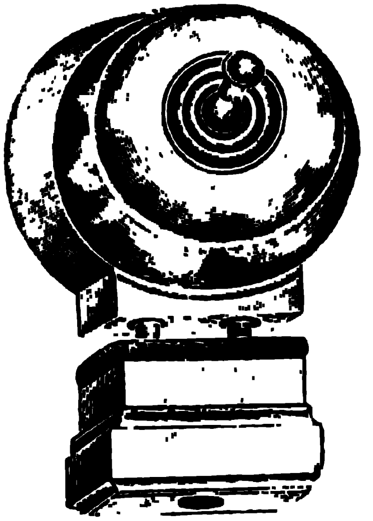
On Polished Wood Bases, High Voltage.



Flat Type Switches and Combined Switch with Plugs.



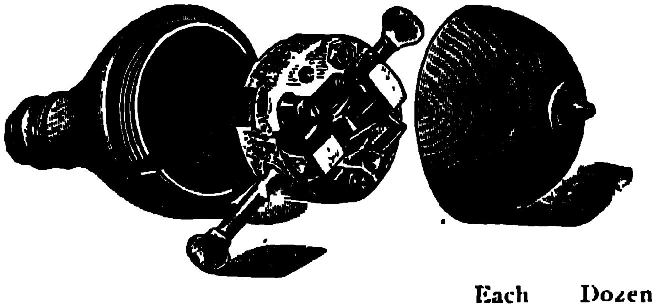
Capacity.	Particulars.	per doz.	
		Rs.	**A.**
5 Amps.	Porcelain Cover	**10**	**0**
3 "	Plain Brass Cover Midget Switches	**13**	**8**
5 "	" " Two-way Switches	**18**	**0**



5 Amperes, Combined Switch and two-pin Plug.
Rs. 2-12 each. **Rs. 27-0** doz.

Pear Switches.

For Suspension by Flexible Cord, High Voltage.



In Polished Cocus wood

	Each	Dozen
	Rs. 1-10	**18-0**

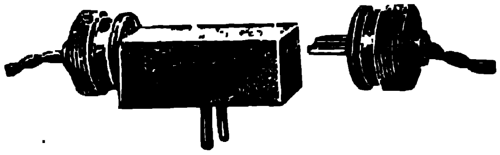
Slipper Type Switches

For Railway Carriages.

Slipper Switches, Polished Brass Covers on white china base. **Rs. 21-0** doz.

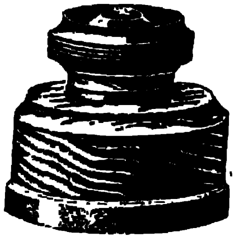
Installation Fittings and Accessories.
Wall Shoes and Plugs.

250 Volts.



	Rs. A.	Rs. A.
Porcelain and Cocus. Two-way Duplicating Plugs ..	4 4	50 0

Two-Pin House Service Type.



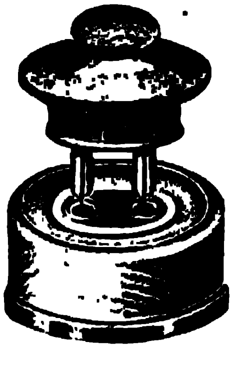
Description.	mps	Type.	Price. Each. Rs. A.	Price. Per doz. Rs A.
Cocus Wood	5	Pin ..	1 6	16 0
Spare Plugs Cocus Wood			0 12	7 8

Hand-Shield Type.

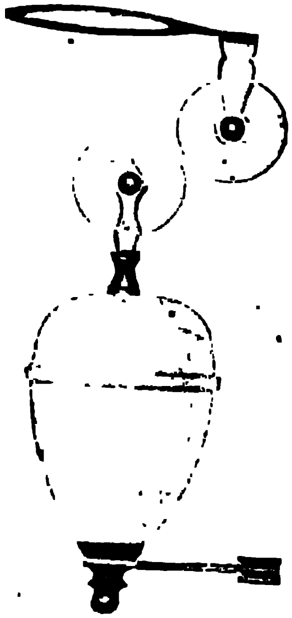
This is a **Shock-proof** Wall Plug. The shield is provided to protect the operator against all possible shocks or burns.

5 Amperes. Cocus Cover and Plug.
Each **Rs. 2-0**
Per doz. „ **21-0**

10 Amperes, Cocus Cover and Plug.
Each **Rs. 2-8**
Per doz. „ **29-0**



Hand-Shield Plug.



Counterweights.

Cream China Counterweight, all brass parts polished.
Per set **Rs. 2-0**

Polished Brass Counterweight.
Per set **Rs. 3-4**

Admiralty Type.
Watertight Plugs

For use on ship-board and in all exposed situations.

Complete with Plug and cap for protection when socket is not in use.

All Brass two-pin types,
10 Amp. Capacity. **Rs. 10-0 each.**

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

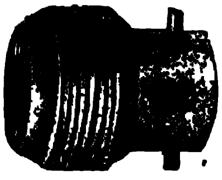
JESSOP & Co. Ltd
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

Installation Fittings and Accessories.

Plug Adaptors.

For connecting to Lamp holders, enabling current to be tapped off and affording a ready means of connecting up temporary lights, table standards, fans and radiators, etc.



Figs. 1 and 2.

Fig. No.	Description.	Price. Each. Rs.	A.	Per doz. Rs.	A.
	Beech Wood	0	9	6	0
	Miniature Brass Centre Contact	0	12	8	0
	Miniature Brass Double Contact	0	12	8	0
	Two-way Plug Adaptors ..	3	10	42	0

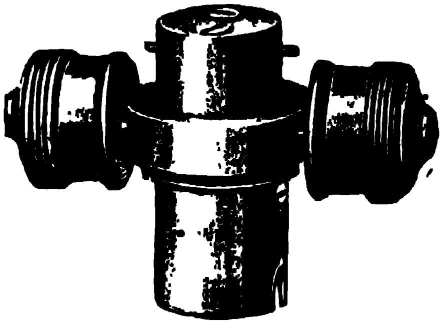


Fig. 3.

Insulating Materials.

Description.	Width Ins.	Rs.	A.
Tape, Silk, Dynamo per gross yard		30	0
Egyptian „ „	1	6	4
	¾	4	8
„ „ „ „ „	½	3	12
Adhesive, Black per lb	1	2	2
	¾	2	4
	½	2	6
Pure Para Rubber	¾	6	0
„ „ „		6	0
Prepared Black Rubber		2	4
Okonite Tape „	½	7	8
Braided Cotton Sleeving per 100yds	Small	8	0
„ „ „ „	Medium	12	0
	Large	40	0

Description.	Width Ins.	Rs.	A.
Leatheroid Sheet 5 mils thick per lb.	45	2	4
Cloth, Empire, 010 inches thick per yd.	36	2	0
Tape, Empire, ·007 „ „ per gross yds.	¼	6	10
Chatterton Compound per lb.		3	0
Micanite Cloth, 1/32 in. thick 36×40 ins		Rs. 4	0 per lb.
Presspahn Sheeting, 2 m/m thick. 38×36 ins		„ 1	8 „
„ „ 0-2 m/m. thick, 32×24 ins.		„ 2	6 „
„ „ 1/16 in. thick. 30×24		„ 1	2 „
„ „ 1/32 „ „ 30×21		„ 1	2 „
„ Ohmaline Black Insulating Varnish		„ 13	0 p. gal.

Ebonite Rods.

Size, S.W.G.		2", 1¾" & 1½"	1¼", 1", ⅞" & ¾"	⅝", ½" & ⅜"
Price, per lb. ..	Rs.	3-12	3-8	3-6

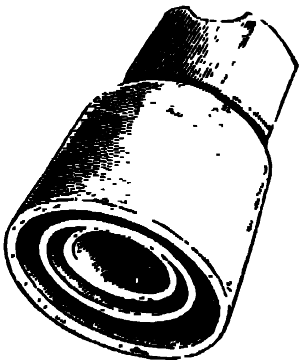
Red Fibre Rods.

Size, S.W.G.	1¼"	1"	¾"	⅝"	½"
Price, per lb. .. .. Rs.	8-6	8-0	7-12	7-8	7-8

High Tension Insulators.

H. T. Line Insulator.	**H. T. Line Insulator.**
Suitable for 3,000 Volts.	**Suitable for 2,000 Volts.**

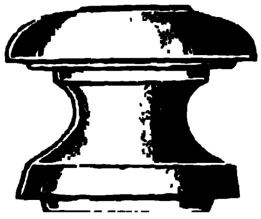
Size 4¾ by 4⅛ ins. fitted with ⅝ in. Galvanized bolt and nut.
Price, Rs. 4-8 each.



Size, 5¾ by 3¾ ins. fitted with ¾ in. Galvanized bolt and nut.
Price, Rs. 5-4 each.

Working Voltage	3.3 K.V.	11 K.V.
Height ..	[illegible]⅛"	6⅛"
Diameter	4½"	5⅝"
Price, each . **Rs.**	**4-12**	**8-8**

The above are fitted with patent cone seated Spindles.



H. T. Shackle Insulator.

Suitable for 3,000 Volts.

Size, 4 by 4½ ins. **Rs. 3-4** each.

Low Tension Insulators.

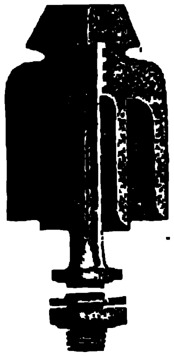


Fig. No. 1

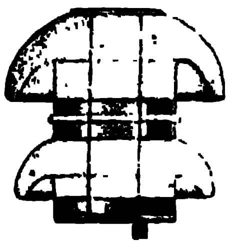


Fig. No. 2.

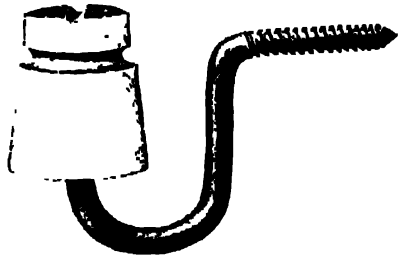
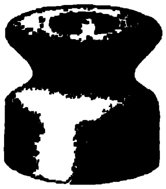


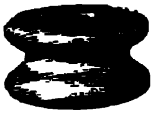
Fig. No. 3.

	Size in inches.	**Price, per dozen.** Rs.	A.
Fig. 1 "Cordeaux" Type with bolt and nut	4¾"×3¼"	17	8
" 1. Sinclair " " " " "	4"×2½"	14	8
" 2. Shackle Type with bolt and straps	3½"×3"	18	0
" 2. " " " " " "	2½"×2'	15	0
" 3. Telephone Type with Swan Neck Screw	3⅝"×2½"	18	0
	2½"×2⅜"	12	0

Insulators.



Bobbin Insulators.

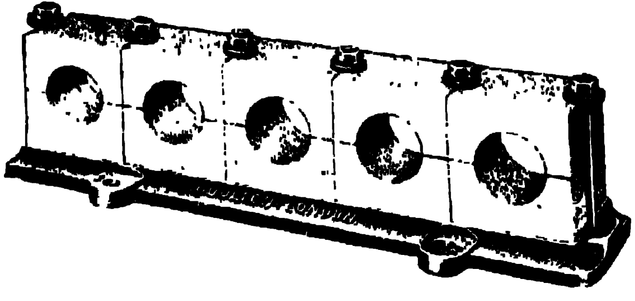


Reel Insulators.

Size.	Price, per gro
1¾"×1⅝"×½" groove ×⅝" hole	Rs. 48
1⅜"×1⅜"×½" " ×½" "	" 44
1¼"×1¼"×⅜" " ×⅜" "	" 20
1⅛"×1⅛"×¼" " ×¼" "	" 15
1" ×1¹⁄₁₆" ×¼" " ×³⁄₁₆" "	" 18

Size.	Price, per doz.
2¼"×1¼"×⅝" groove ×⅝" hole	Rs. 5-0
2½"×1⅞"×1" " ×¾" "	" 6-4
2"×1⁵⁄₁₆"×⅝" " ×¾" "	" 4-0
1¾"×1"×½" " ×½" "	" 2-4

Rack Insulators.



Size 2⅛"×2"×1⅝"
For ¾" to 1" dia. Cables **Rs. 5-0** per doz. pairs.

Size 3⅛"×2⅝"×1⅞"
For 1" to 2" dia. Cables. **Rs. 10-8** per doz. pairs.

Racks for above can be made to requirements.

Porcelain Wall Tubes.

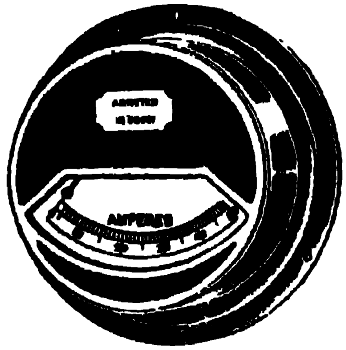
	Length. Ins.	18	24	30	Internal diamet
Brown Porcelain.			—		
	Price, per dozen, **Rs.**	**36-0**	**54-0**	**60-0**	External

CALCUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS,
BOMBAY, LONDON.

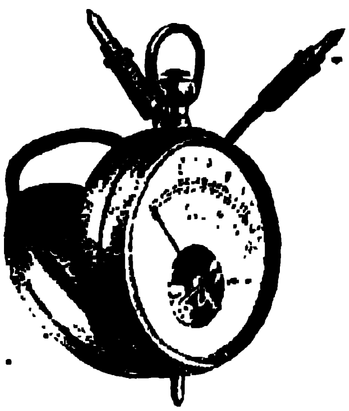
Switchboard Type Ammeters and Voltmeters for A. C. and D. C. Circuits.



Type S. B.
Moving Iron with Enclosed Dials.

Ammeters.			Voltmeters.		
Amperes	6" Dial. Each.	8" Dial. Each.	Volts.	6" Dial. Each.	8" Dial. Each.
	Rs.	Rs.		Rs.	Rs.
10	32		..	..	..
15	33	.	60	32	..
30	35	45	80	34	50
60	36	47	120	38	54
80	36	47	150	37	57
100	38	48	200	50	60
150	41	51	500		61
200	.	65	..	..	..

Battery and Cell Testing Instruments.



Pocket Type.

Pocket Cell Testing Voltmeter 0 6 Volts .. **Rs. 10-0** each.

Pocket Cell Testing Voltmeter 0-15 Volts .. **Rs. 10-0** each.

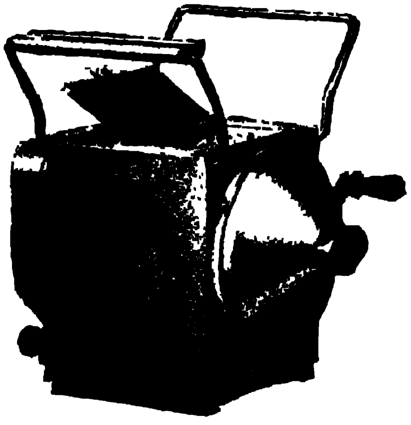
Watch Type Pocket Pole Finding Indicators for 220 Volts Max. .. **Rs. 28-0** each.

Pocket Cell Testing Volt and Ammeter combined, reading up to 6 Volts and 15 Amps. **Rs. 12-0** each.

Hydrometers Syphon Type. **Rs. 24-0** each.

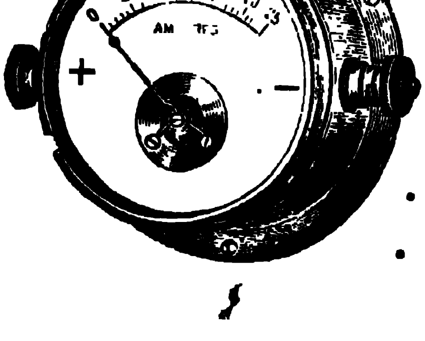
Cell Type „ **6-4** „

Evershed and Vignoles Variable-Pressure "Meg" Testing Sets.



Low Range,
100 Megohms, 500 Volts
I . 325-0 each.
Weight under 7 lbs.

Battery Charging and Small Switchboard Instruments.



3 inches Nickel-plated Voltmeters with side connection 0-6 and 15 Volts . .. .. **Rs. 12-0 each.**

3 inches Nickel-plated Ammeters with side connection 0-15 and 20 Amperes .. .. **Rs. 12-0 each.**

CUTTA, JAMSHEDPUR,
DELHI, LUCKNOW,

JESSOP & Co. LTD
ENGINEERS

RANGOON, MADRAS
BOMBAY, LONDON.

High Torque D.C. Amp.-Hour House Service Meters.

The Electrical Apparatus Co., Ltd.

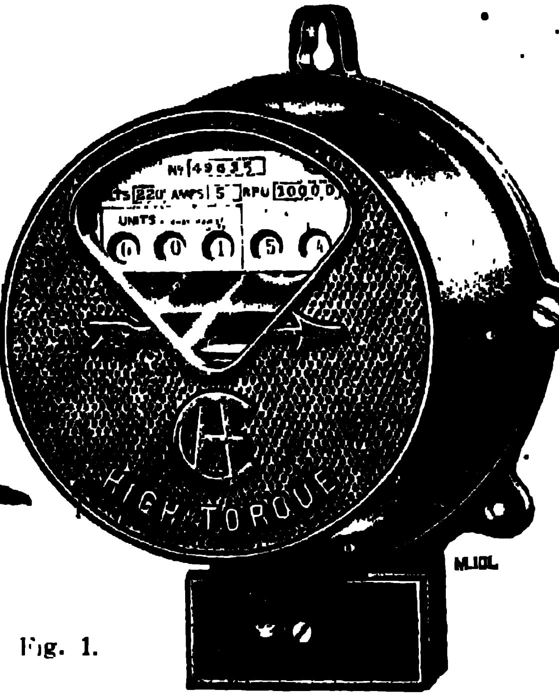


Fig. 1.

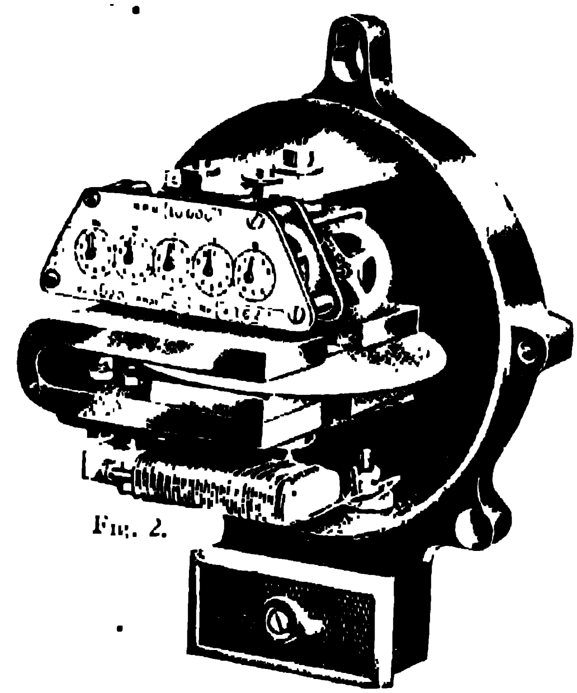


Fig. 2.

Two kinds of recording mechanism are employed, *viz.* the cyclometer pattern (see fig. 1), and the clock pattern (see fig. 2), both types registering direct in kilowatt hours.

The E.A.C. High-Torque Meter has now been on the market for over eight years, and is in continuous use in more than 350 Supply stations throughout Great Britain and Ireland, apart from large numbers of stations in the Colonies and other parts of the world.

Low Starting Current.

Slow Speed.

Solid Cast Iron Dust and Damp-Proof Case.

Voltage D. C.	Capacity. Amps.	Price, each. Rs	A
110 & 225	5	46	0
110 & 225	10	54	0
230	15	65	0
230	25	73	0
230	50	90	0
230	75	114	0
230	100	135	0
440	15	65	0
440	25	73	0
440	50	90	0
440	75	114	0
440	100	135	0

Permanent Accuracy at all Loads.

High Insulation Resistance.

Mica Insulating Material.

Features of the E.A.C. High-Torque Meter.

Highest torque of all Ampere-Hour meters on the market. Mica insulated internal Armature coils, enclosed and protected by the aluminium brake discs. 18 carat gold commutator segments and brush tips of a gold alloy. Oil hardened pivots and spring seated jewelled bearings. Highest grade counter mechanisms. Simple and wide range of adjustment. Protection against mechanical damage and magnetic interference. British manufacture.

Prices for Meter of other Voltages on application.

"Sterling" Magneto Blasting Machine.

Metal Case.

Approved by Home Office. No Push Button required.

Magneto **High-Tension** Blasting Machine, with Automatic Contact Device, enclosed in solid drawn Nickel-plated Brass Case with detachable Firing Key, heavy milled Terminals, and strong Leather Carrying Strap.

To fire 2 shots in parallel.

Dimensions of case 3¾ by 2 by 3½ ins. high.

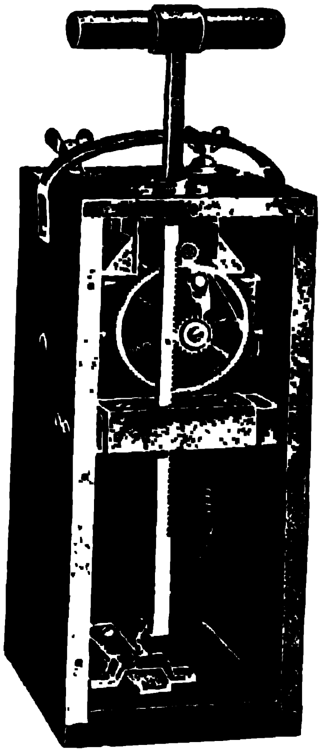
Dimensions overall, 3¾ by 2¾ by 4½ ins.

Weight 3 lbs.

Price, Rs. 115-0 each.

"Sterling" Dynamo Low Tension Blasting Machine.

(Rack-Bar Type.)



Rack-Bar Dynamo Low Tension Blasting Machine, comprising strongly constructed Dynamo provided with Rack-Bar and Pinion Driving Gear, adapted to be operated by a sharp downward thrust. A short circuiting device is provided by means of which the current is prevented from passing to the line until it attains its maximum pressure, *viz.*, at the termination of the downward stroke, when this device is operated and the current free to pass out to the line and explode the charge.

In Oak or metal case with leather carrying strap.

No. U. 2603 (Oak case) to fire 10 shots in series.

Note —In operation it is necessary to first pull up the Rack-Bar and then push forcibly downward as far as it will go: as the current can only pass to the line at the end of the stroke, it will be readily understood that the possibility of accidental firing is extremely remote .. **Price, Rs. 225-0** each.

Complete Battery.

Batteries for Electric Bells.

Leclanche-Porous Pot Cells with Carbon-capped Plates, and Zinc Rods.

Item.	No. 1. 3 Pint size.				No. 2. 2 Pint size.			
	Each		Per dozen.		Each.		Per dozen.	
	Rs.	A.	Rs.	A.	Rs.	A.	Rs.	A.
Complete Battery	2	10	30	0	2		22	0
Porous Pots only		4	14	0	1	2	9	8
Glass jars only ..	1	2	12	0	1	1	10	0
Zinc only ..	0	5	3	0	0	4	2	12

Sal-amoniac.

Price per lb. **Re. 1-0**

The following quantities are recommended for charging these batteries.

No. 1, Size, about 14 ozs.

No. 2, Size, about 8 ozs.